Evaluating the Impact of Money Market Instruments on Price Stability in Nigeria

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Abstract

Money market obviously has been among the prominent topics in global discourse concerning steering an economy on an even keel. Nigerian economy has been battling with inflation for the past seven years and it is becoming worse since 2022 with unprecedented galloping inflation with its resultant untold economic discomforts. Consequently, this study with an annual data range 1990 – 2021 is an evaluation of the impact of money market instruments on price stability in Nigeria. using indicators such as Treasury Bills (TB), Discount Windows (DCW), Mutual Funds (MTF), and Risk Premium Lending rate (RPL) to measure money market instruments; and measures such as consumer price index (CPI) and Gross domestic product deflator (GDP-Deflator) measured price stability; while we controlled inflation rate (INF) and exchange rate (EXR). In addition, the results of the CUSUM and CUSUMSQ graphs show that there is no evidence of instability in the series of data from 1990 to 2021. Evidence from the main findings shows that while negative and significant long-run relationships exist between CPI and money market instruments, positive and significant long-run relationships exist between GDP-Deflator and money market instruments in Nigeria. The study concludes that negative long-run relationships exist between money market instruments and price stability in Nigeria hence recommends that government should checkmate the rule of law, governance, regulatory quality, and overall institutional quality to improve the stability of the price of all commodities including money market instruments.

Keywords: *Money market; Inflation; Market instruments; ARDL; CPI; GDP-Deflator*

1. Introduction

The money market is an essential part of every economy since it plays a vital role in the economic growth process of the country (Pavtar, 2016) and banks' liquidity management as well as the transmission of monetary policies by providing the suitable instruments for liquidity trading (Iwedi & Igbanibo, 2015; Nwonye et al, 2020). Umason (2018) emphasized on the importance of the money market, to the government, the money market instruments help in meeting government short-term fall in revenue through sales of securities such as eligible development fund, Treasury certificates. To the business firms, it bridges the liquidity challenges by making it possible to invest excess liquidity and source shortage of liquidity, while to the monetary authority it is a mechanism for the achievement of monetary policy objective such as price stability (Onodugo, Anowor & Ofoegbu, 2018). Money market is a component of financial market and constitutes market for short term investible fund where short term financial instruments or liquid assets with maturity of within one year are traded. Its major significance is that it is the machinery for the mobilization of short-term financial resources for economic growth. Investment that promotes liquidity and gives immediate income requires short term funding with maturity of within one year (Anowor & Nwanji, 2018; Oloyede, 2014 and Ikpefan & Osabuohien 2012).

However, businesses, banks, and the government which is often in need of a large amount of low-cost capital for a short time have relied heavily on money market instruments to thrive, in which they would have ordinarily waited until their goods and services are sold out (Onodugo, Kalu, Anowor & Ukweni, 2014; Kimberly, 2022). The stability of price of financial market instruments is too important to firms, banks, and governments since their outcomes are used to make investment decisions spontaneously. Hence the banking system and the money market signify the exclusive setting in which monetary policy operates. The money markets in Nigeria just like other countries' money markets are made up of various financial instruments such as treasury bills, treasury certificates, banker's acceptance, commercial papers, eligible development funds, certificates of deposits, etc. which have various maturity durations – 30days, 60days, or 90years and less risky (Kanu, 2011).

A developed, active and efficient money market enhances the efficiency of central bank's monetary policy and the transmission of its impulses into the economy (Ehigiamusoe, 2013). Ezirim, (2005) as cited in Umason (2018) opines that understanding the transmission of monetary policy to inflation and other real economic variables is a key for central bankers to conduct monetary policy effectively. Also, the monetary policy objective of price stability can be tarnished if the policy does not match with other fiscal measures in the economy. Therefore, it becomes imperative to analyze monetary policy transmission such as the money market instruments and its effect on inflation for a developing economy like Nigeria. Also, as part of intervention policy in the fund and liquidity management by the Central Bank of Nigeria, the highly marketable short-term financial assets are pulled to accommodate the synergy between Central Banks and financial institutions, and binding of a greater volume of deposits pulled from investors, which has improved the price stability of instruments of the money markets in Nigeria (Atanda and Ajayi, 2012).

However, there are challenges facing the effectiveness of Nigeria money market as effective instrument of managing inflation which include, inconsistent policy of the regulators and the monetary authorities, absence of a well-developed money market which poses a challenge in pooling funds large enough to fund private enterprises (Pavtar, 2016), immature secondary market, undiversified instruments, lack of proper coordination in the issuance of debt instruments, inadequate and deficient information flow, among others (Ishola, Oni, & Kolapo. 2021; Anowor et al, 2022). Suffix to say that money market instruments rely on the in-time cash crunch of short-term marketable debt instruments, which yields lead to profit maximization. Many firms and institutions have testified to the ubiquity of money market instruments as a result of their short-term maturity in nature, high liquidity and minimal risk notwithstanding, most firms and institutions are reluctant to invest in money market instruments, instead, their investment choices are often based on statutory Central Bank of Nigerian threshold and would prefer to trade with other large funds where high-interest rates are negotiated and thus, they achieve higher returns.

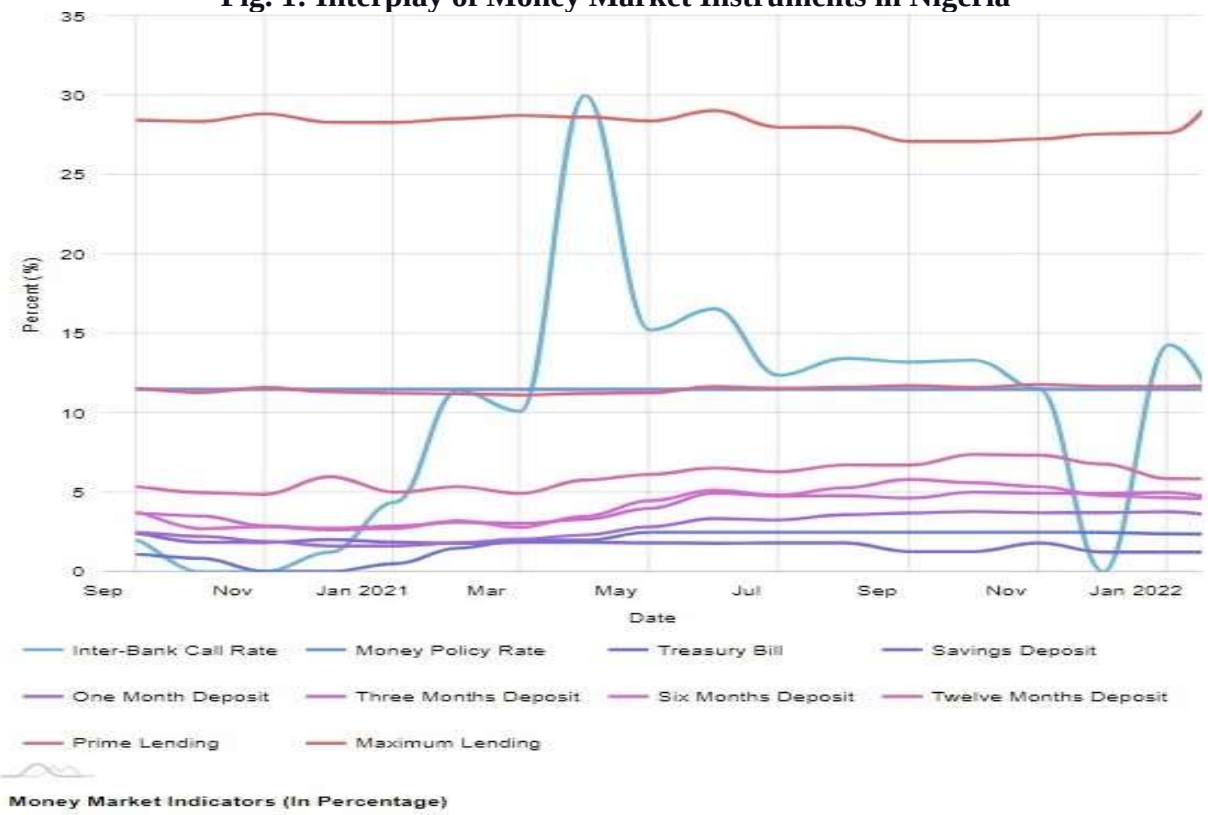
In addition, regardless of the tremendous ubiquitous footprints of money market instruments in Nigerian money markets, the stability of the prices of the instruments has bothered the investors over the years (Isibor, et. al. 2016) and trading of money market instruments involve high denominations which offer significant low returns than most other securities (Ndugbu et al, 2016). Hence, ever since the emergence of economic globalization in 1986 which led to significant increases in the volume of money market instruments in Nigeria, the prices of the money market instrument have become unstable over the years (Iyegbuniwe, 2005; Anowor, Ichoku & Onodugo, 2020). Ochei and Osabuohien (2012) document that "the Nigerian money market is constrained by poor, inadequate instruments needed for easy and continuous working of the market" which make the investors rely on volatile money market prices. These unstable prices have a dearth impact on the investors as it leaves them with difficulties in the investment decisions and hence, low returns. The market rate is not reliable, as it leads to changes in macroeconomic policies which will impact the returns and performance of the money market instruments. Thus, these trends of problems and circumstances have raised big concerns and doubts about the impact of money market instruments on price stability, hence, the reason for this study.

From the foregoing, this study will evaluate the impact of money market instruments on price stability in Nigeria and much emphasis will be laid on identifying and examining money market instruments and the stability of prices in Nigerian. We will employ annual time series data spanning from 1990 to 2021 and the autoregressive distributed lag (ARDL) model. Money market instruments were measured with Treasury Bills (TRB), Discount Windows (DCW), Mutual Funds (MTF), and Risk Premium Lending (lending rate minus Treasury bill rate %); while Price Stability (PS) was measured with consumer price (CPI) and Gross Domestic Product Deflator (GDP-Deflator). Thus, the control variables are Inflation Rate (INFR) and Exchange Rate (EXR). In addition to this, we organized the remaining sections of this paper in this manner: section 2 discusses the evaluation of Nigerian money markets, section 3 contains the review of related literature, methodology, nature of data, and model Specifications were done in section 4, section 5 houses the empirical findings and discussions, and section 6 contains the conclusion and recommendations.

2. Evaluation of Nigerian Money Market Instruments and Price Stability

The Money market is seen as a market where short-term financial assets are traded as nearest substitutes for money or money exchanges. Typically, the money market is a mechanism, which aids the lending and borrowing of short-term monetary instruments in less than a year. The Money market is very significant in the lives of investors since it allows them to swing between high liquidity and short-term maturity in their investment returns. In Nigerian money markets, instruments such as Banker's Acceptance, Promissory Note, Bills of exchange or commercial bills, Call or Notice Money, Inter-Bank Term Market, Treasury Bills, Repurchase Agreements (Repos), Certificate of Deposits and Commercial Papers among others are being traded in the markets to bridge the gap of the financial needs from the deficit unit to surplus unit.

Fig. 1: Interplay of Money Market Instruments in Nigeria



Source: Central Bank of Nigeria database.

Despite the tremendous commitments made by the Central Bank of Nigeria to develop the money markets in Nigeria, the stability of the prices of the instruments has become so worrisome to the investors. Since the prices of the instruments are not often stable, investment decisions are unpredictable, the rate of return on the investments is indecisive, and the performance of the money market instruments is greatly affected. Price instabilities have affected the general market prices of even products, and commodities, thus, leading to poor economic performance. Consequently, when this persists, businesses, banks, firms, and the government will no longer meet up with investment decisions and targets, which expose them to managing risks. However,

the costs associated with instability of prices of money market instruments will tend to shoot up the cost of living, cost of goods and services, and cost of raw materials for firms and businesses. At this stage, the expected returns from the invested funds in the money market instruments will not be met.

From the foregoing, scholars have over the years tried to study the impact of money market instruments in various ways and various objectives (See: Anowor, Nwonye, Okorie & Ojiogu, 2019; Akarara and Eniekezimene, 2018; Etale and Ayuku, 2017; Eze and Mansi, 2017) among others and have found mixed outcomes. The major factors militating against the price stability of money market instruments in Nigeria include; incompetent skill for the development of financial products, inability of regulators and stakeholders to collaborate, lack of funds to invest in long-term financial products, poor risk management system, high insecurity and very high financial fraud, lack of financial literacy and inclusion, low acceptability of mobile money at merchant locations, non-availability of good collateral management, private companies' unwillingness to go public, insufficient foreign direct investment and unavailability of integrated credit scoring system among others (Chenemi, 2020). Thus, this study will centre on investigating the impact of money market instruments on price stability in Nigeria.

3. Review of Related Literature

In the axioms of the literature, many scholars have argued that prices of money market instruments are not stable, but the intervention of the government through monetary policy will bail the situation out. Wicksell (1898) proposed The Cumulative Process Theory in which he aimed at distinguishing between the natural rate of interest and the money rate of interest. As argued by Wicksell, "the interest rate as given in financial market is called the money rate of interest, while the interest rate at which the supply and demand of goods are in equilibrium in the market is the natural rate of interest. The assumption of Wicksell's theory is that money is created endogenously, which leads to changes in the real market.

However, with an increasing number of scholars gearing interests towards investigating the relationship between money market instruments and price stability, we enjoined the existing literature to make our extensive contributions, hence we evaluate the impact of money market instruments on price stability in Nigeria and we carried out a review to see the efforts made by previous authors. In this vein, these authors Akarara and Eniekezimene (2018) applied Autoregressive Distributed Lag (ARDL) Bound Testing Approach to Cointegration to analyse the money market instrument impact on the growth of the Nigerian economy using indicators such as certificate of deposit (COD), commercial paper (CPR), broad money supply (M2G), treasury certificate (TRC) and gross domestic products (GDPR) and they found the existence of long-run union between the variables and economic growth. On the same note, in an attempt to figure out if money market instruments promote economic growth or not, Etale and Ayunku (2017) gathered data for money market instruments from the central bank of Nigeria's statistical bulletin. Specifically, they used money market measures such as commercial papers (CPs), treasury bills (TBs), and bankers' acceptances (Bas), and gross domestic product as a measure of economic growth. They estimated the aforesaid variables with granger causality and OLS estimation techniques and thus, made the following findings: strong positive and significant causality between TBs, CPs, and economic growth and positive but non-significant causality

between BAS and economic growth in Nigeria. Furthermore, Eze and Mansi (2017) in their extensive study aimed at investigating the causality analysis of the money market and economic growth in Nigeria from 1990 to 2014 by selecting measures such as treasury bills, treasury certificates, certificates of deposits, and banker's acceptances to measure money market and gross domestic products to measure economic growth in Nigeria. Their study's findings from the parsimonious error correction results show that the money market has a significant impact on the Nigerian economy. In a recent study, Umason (2018) investigated the relationship between money market instruments and inflation rate in Nigeria by employing various secondary data such as inflation rate, treasury bills, stabilization securities, eligible development stock, and gross domestic products as well as multivariate and granger causality Models. The result shows that money market instruments are negatively statistically significant to the inflation rate in Nigeria.

Uruakpa (2019) employed the ordinary least square to examine the impact of money market reforms on economic growth in Nigeria covering the period 1990-2017. The OLS result suggests that money market value has positive and significant effect on GDP while treasury bill outstanding has positive but non-significant effect on GDP. However, treasury bill rate had negative and significant effect on GDP. Similarly, Okoyan and Eze (2021) recently explored the effects of money market instruments on capital market performance in Nigeria from 1981 to 2018, using Johansen cointegration, and Vector error correction model. They found that treasury bills (TB), and commercial paper (CP) trading exerts a negative relationship with capital market performance in Nigeria. Covering the period of 1989 – 2019 with time-series data in Nigeria, multiple regression, and granger causality test, Orugun, Saliu & Ajayi (2020) examined the impact of selected money market instruments (Treasury Bills, Certificate of Deposit, Commercial Papers, and Development Stock) on the economic growth. They found that a positive relationship exists between money market instruments and economic growth. To investigate the nexus between the money market and Nigerian economic growth, Pavtar (2019) obtained time-series data spanning from 1985 to 2014 and regressed it with descriptive statistics and ordinary least squares (OLS) multiple regression techniques. The research findings show that Treasury bill, treasury certificate, and commercial paper do not have any significant effect on economic growth, whereas certificate of deposits portrayed a significant impact on the economic growth in Nigeria. Ogbonna and Ejem (2019) equally using the Auto Regressive Distributed Lag method examined the long-run relationship as well as the level of causality between the money market instruments and economic growth in Nigeria within a period that covers 1981 to 2017. The empirical result revealed that there is no significant effect of money market instruments on economic growth of both in the short run and in the long run. Nevertheless, there is a strong causal effect that runs from nominal GDP to Treasury Bills. Agbada and Odejimi (2015) examined the impact of money market instruments on the economic viability of Nigeria for the period 1981 to 2011 using OLS multiple regression. GDP was used to measure economic viability while Treasury bills (TB), Treasury Certificate (TC), Certificate of Deposit (CD), Commercial Papers (CP) and Banker Acceptances (BA) were used to measure money market instruments. The result of the study showed a positive relationship between the dependent variable (economic viability) and independent variables.

Ezeaku, et al. (2018) using Johansen cointegration and the error correction model (ECM) examined the industry effects of monetary policy transmission channels in Nigeria for a period of

34 years from 1981 to 2014. The result of the research revealed that both in the long run and in the short run that private sector credit, interest rate, and exchange rate channels have negative effects on real output growth. The result further indicated that, in the Nigerian scenario, monetary policy transmission channels have a composite long-run relationship with real sector growth and performance, and any disequilibrium in the system is corrected. Ufoeze, et al. (2018) applying the ordinary least square and co-integration tests examined the effect of monetary policy variables such as monetary policy rate, money supply, exchange rate, lending rate and investment on GDP, measure for economic growth in Nigeria from 1986 to 2016. The results of the study indicated that monetary policy rate, interest rate, and investment have non-significant positive effects on economic growth in Nigeria, whereas, money supply has significant positive effect on growth in Nigeria. Afolabi, et al. (2018) on their study examined the link between monetary policy instruments and Deposit Money Banks Loans and Advances in Nigeria for 36 years covering 1981 to 2016. The study employed Toda and Yamamoto Granger's non-causality model and discovered that structural changes in the monetary policy system exerted a positive significant impact on loans and advances of Deposit Money Banks in Nigeria. Equally, a bidirectional relationship exists between MPR and loans and advances of Deposit Money Banks in Nigeria, that is MPR granger causes loans and advances in Nigeria and vice versa. However, broad money supply (LM2), liquidity ratio (LR), inflation rate (IFR) and cash reserve ratio (CRR) did not granger cause loans and advances of financial institutions in Nigeria.

Fapohunda, Ogbeide & Ogunniyi (2019) using the ordinary least square multivariate regression method, examined money market instruments and financial deepening in Nigeria. The study employed money market instruments like Treasury bills (TBs), Bankers' acceptances (BAs), Certificate of deposits (CDs) and Commercial papers (CPs), while the ratio of money supply to gross domestic product was measure for financial deepening. The result found significant positive effect of money market instruments on financial deepening in Nigeria in the long run. Ndugbu, Duruechi and Ojiegbe (2016) examined the relationship between money market instruments and bank performance in Nigeria for the period 1990 to 2014. The ordinary least square multivariate regression method was used to analyze the data. The results revealed that treasury bills, and commercial papers have positive and significant relationship with bank performance in Nigeria, while bankers' acceptances have a negative relationship with bank performance.

In another study Krokeme & Eze (2021) used Johansen cointegration and vector error correction techniques to examine how the money market instruments such as commercial paper, Bankers' acceptance and Treasury Bills affects market capitalization of the Nigerian capital market from 1981-2018. The results reveal that treasury bills (TB) and commercial paper (CP) have negative effect on market capitalization. The implication is that an increase in purchase of treasury bills and commercial paper would result to a fall in the annual market capitalization of the Nigerian capital market. However, there is a positive relationship was between bankers' acceptance (BA) and annual market capitalization.

4. Data and Methodology

Nature of Data

In an attempt to evaluate the impact of money market instruments on price stability, a set of annual time series data ranging from 1990 to 2021 concerning the tradable money market instruments in Nigerian, sourced from the central bank of Nigeria (CBN) statistical bulletin were employed. These indicators include Treasury Bills (TB), Discount Windows (DCW), Mutual Funds (MTF), and Risk Premium Lending – RPL (lending rate minus Treasury bill rate %), were used to measure money market instruments; while consumer price index (CPI) and Gross Domestic Product Deflator (GDP-Deflator) were used to measure price stability. The control variables were inflation rate (INFR) and Exchange Rate (EXR). These indicators were sourced from the central bank of Nigeria Statistical Bulletin 2021 edition and World Bank's World Development Indicator (WDI), thus, the choice of the aforesaid data was based on the availability of data within the research period in Nigeria. To improve the understanding of the readers, we defined each of the model variables as below.

Definition of the Variables

Treasury Bills (TB) are short term investment instruments that are issued by the Federal Government through the Central Bank to raise funds from individuals and organizations. Thus, when investors buy the Treasury bill, they are lending money to the government. The maturity of the Treasury bill is often 30dys, 60days or 90days. Discount Windows (DCW) is regarded as an instrument of the monetary policy that allows eligible institutions to borrow money from the Central Bank, usually on a short-term basis, to meet temporary shortages of liquidity caused by internal or external disruptions. Mutual Funds (MTF) are referred to as professionally managed investment funds that pool money from many investors to purchase securities such as stocks, bonds, or other assets. Risk Premium Lending (RPL) is the interest rate charged by financial institutions on loans to private sector customers minus the risk-free Treasury bill interest rate at which the short-term government securities are issued or traded in the market. Consumer Price Index (CPI) is defined as the price of weighted average market prices of a basket of consumer goods and services purchased by households. GDP-Deflator is the measure of the changes in prices of all the goods and services produced in an economy. It is used to measure the price level of all-new, domestically produced, final goods and services in an economy in a year. Inflation Rate (INF) is the persistent increase of general prices of goods and services in a country during a specific period. The Exchange rate (EXR) is the rate at which a currency is exchanged for another currency.

Descriptive Statistics

To further describe the data, a descriptive statistical analysis of the data was carried out. This test measures the simple summary of characteristics of the model variables to ascertain whether the variables are the most suitable for the relationship that is being tested. Below in Table 1 is the results of the descriptive statistics, in which we found that the values of the mean, median, standard deviation, Skewness, and Kurtosis for all the variables are not far from each other. Furthermore, we found that the total variations in the series range from -1.969778 to 10.19488

which represents the minimum and maximum values in the series, and more importantly, the probability values of the Jarque-Bera statistic for all the variables are less than 0.05 which entailed that the variables are normally distributed and thus, suitable for the estimation of the relationship that exists between money market instruments and price stability in Nigeria.

Table 1: Summary of Descriptive Statistics and Spearman's Correlation Results

	CPI	GDP-Deflator	TB	DCW	MTF	RPL	EX	EXR
Mean	3.585851	2.493599	0.589146	4.155573	3.803245	1.874047	2.725385	4.362109
Median	3.882994	2.332759	0.666594	3.456930	3.300825	1.874872	2.542763	4.845933
Maximum	5.589163	4.322829	4.020974	10.19488	7.573402	2.721679	4.288204	5.882795
Minimum	0.401617	-0.376734	-1.969778	-0.006390	2.121293	0.905567	1.684176	1.996703
Std. Dev.	1.487701	0.921788	1.116618	2.399551	1.548298	0.399813	0.718088	1.160332
Skewness	-0.702618	-0.624161	0.444854	0.647738	0.994456	-0.226356	0.873560	-0.705037
Kurtosis	2.456523	4.424407	4.820872	2.843234	3.019067	3.613815	2.657992	2.157822
Jarque-Berra	9.026742	47.72992	15.13947	25.19991	5.274842	9.727146	4.225862	3.596759
Probability	0.000167	0.000493	0.000768	0.000956	0.001546	0.005188	0.000883	0.000067
Observations	32	32	30	31	32	30	32	32
CPI	1							
GDP_DEFLATOR	-0.641134	1						
TB	-0.915374	0.339233	1					
DCW	-0.529555	0.745651	0.082326	1				
MTF	-0.391698	0.303566	-0.078410	0.356181	1			
RPL	0.590846	-0.687498	0.127728	0.065821	-0.228543	1		
INF	-0.422381	0.591125	0.377226	0.408966	0.112014	-0.189046	1	
EXR	0.955369	-0.468989	-0.224306	-0.263577	-0.463968	0.291265	-0.512278	1

Author's Conception

In addition, evidence from Spearman's correlation results showed that correlations exist between money market instruments and price stability in Nigeria. Specifically, measures of money market instruments such as treasury bills, discount window, mutual funds, and the risk premium on lending have strong negative correlations with price stability measures – consumer price index and gross domestic product deflator, equally, inflation rates also have negative correlations with price stability, whereas exchange rate portrayed positive correlations with price stability. Thus, controlling the volatile prices of money market instruments in Nigeria which are often done with the aid of monetary policies has been compromised in recent years due to several reasons such as fiscal munificence, lack of operational autonomy of the central bank, insufficient and low-quality statistics, a weak transmission mechanism, weak institutional quality and absence of strong financial system (Nicoletta, 2004). Hence, it will be advised that the Nigerian monetary authorities should endeavour to stabilize the process of the instrument of the money markets, encourage more investors, develop the market and achieve economic growth.

Analytical Framework

In the view of the classical monetarists', theories are often used to explain the relationship between monetary policies and price levels, hence the relationship between the interplay of the money market instruments and price stability will be best anchored on the quantity theory of money as proposed by Irving Fisher. They argued that the quantity of money is the main determinant of the price level or value of money. This implies that any change in the quantity of currency produced can have an proportionate variation in the price level. Irving Fisher's equation of exchange on the quantity theory of money is given by the following equation,

$$MV = PQ \quad \text{---------- (1)}$$

Where M represents the stock of money, V represents the velocity of circulation of money, Q represents the volume of transactions in the economy within a given period, and P represents the general price level in the economy. If we substitute Y – a measure of the total amount of goods and services exchanged for money in place of Q, then we have:

$$MV = PY \quad \text{---------- (2)}$$

Where, P, V, and Y are endogenously determined within the equation, M is the money market instrument policy variable, which is exogenously determined by the monetary authorities and forces of demand and supply.

Model Specification

Also, this study evaluates the impact of money market instruments on price stability in Nigeria, by employing the dynamic autoregressive distributed lag (ARDL) bounds testing approach as documented by Pesaran et al. (2001) due to its ubiquitous advantages over other cointegration estimation techniques. ARDL can estimate variables with both I(0) and I(1) integration order, it is more suitable for a small sample size like this study, ARDL model can also, estimate both dynamic long-run and short-run parameters including the speed of adjustment simultaneously, thereby destabilizing the problem of over parameterization. These objectives can work efficiently when the variables are integrated at I(0) or I(1) and not I(2) order. Thus, the specified ARDL model for evaluation of the impact of money market instruments on price stability is expressed below.

$$\begin{aligned}\Delta InMPSt = {} & \phi 0 + \wp\, InMPSt-1 + \alpha 1 InTBt-1 + \alpha 2 InDCWt-1 + \alpha 3 InMTFt-1 + \alpha 4 InRPLt-1 + \\ & \alpha 5 InINFt-1 + \alpha 6 InEXRt-1 + \sum_{i=1}^{x} \theta 1 \Delta InMPSt-1 + \sum_{i=1}^{x} \theta 1 \Delta InTBt-1 + \sum_{i=1}^{x} \theta 2 \Delta InDCWt-1 + \sum_{i=1}^{x} \theta 3 \Delta InMTFt-1 + \sum_{i=1}^{x} \theta 4 \Delta InRPLt-1 + \\ & \sum_{i=1}^{x} \theta 5 \Delta InINFt-1 + \sum_{i=1}^{x} \theta 6 \Delta InEXRt-1 + \varepsilon t \quad \text{---------- (3)}\end{aligned}$$

Where $\wp$ and ϕ_0 are the long-run elasticities and the constant respectively; α_1 this is the long-run coefficient, while θ represents the short-run elasticities.

We employed the bounds testing approach to establish cointegration among the variables before estimating the results. The Error Correction Model (ECM) is thus specified to estimate the short-run adjustments to equilibrium in equation (4) as follows:

$$\Delta InMPS_t = \phi_0 + \sum_{i=1}^{x} \theta_1 \Delta InMPS_t + \sum_{i=1}^{x} \theta_1 \Delta InTB_{t-1} + \sum_{i=1}^{x} \theta_2 \Delta InDCW_{t-1} + \sum_{i=1}^{x} \theta_3 \Delta InMTF_{t-1} + \sum_{i=1}^{x} \theta_4 \Delta InRPL_{t-1} + \sum_{i=1}^{x} \theta_5 \Delta InINF_{t-1} + \sum_{i=1}^{x} \theta_6 \Delta InEXR_{t-1} + \Psi ECT_t + \varepsilon_t \quad (4)$$

Whereas the speed of adjustment of the parameter to long-run equilibrium following a shock to the system is the error correction term. The coefficient of the error correction term must possess a negative sign and is statistically significant to be able to measure the speed of adjustment from the long run to the short run.

5. Empirical Findings

Stationarity Tests

Because time-series data would yield spurious regression if not checkmated properly, we employed Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests for this purpose. The essence of complementing both the ADF and PP test is that while the PP test ignores any serial correlation in the series, the ADF uses a parametric autoregressive to approximate the structure of errors in the series. The unit root test has a null hypothesis "has the unit root" and an alternative hypothesis "has no unit root", thus, decisions lie on checking the probability value at a 5% critical level.

Table 2: Results for Unit Root Tests

Variable	ADF	Order of Integration		PP	Order of Integration	
		Level	First Difference		Level	First Difference
CPI	4.103704*** (0.0000)	I(0)	_	16.06987*** (0.0000)	I(0)	_
GDP_Deflator	-3.992484*** (0.0048)	_	I(1)	-7.429365*** (0.0000)	_	I(1)
TB	-9.830079*** (0.0000)	_	I(1)	-5.505122*** (0.0001)	I(0)	_
DCW	-10.01290*** (0.0000)	_	I(1)	-5.217512*** (0.0002)	I(0)	_
MTF	-12.21783*** (0.0000)	I(0)	_	-10.94934*** (0.0000)	_	I(1)

RPL	-3.283871*** (0.0245)	I(0)	_	-3.122526*** (0.0352)	I(0)	_
INF	-3.232574*** (0.0278)	I(0)	_	-5.612887*** (0.0001)	_	I(1)
EXR	-3.829561*** (0.0068)	_	I(1)	-3.728768*** (0.0087)	_	I(1)

Source: Computed by the Researcher. NB: (.) represents the probability value; ***, ** and * represents 1%, 5% and 10% levels of significance. The decision was taken based on a 5% level of significance.

Findings from the results of the unit root test show that the null hypothesis "has the unit root" be rejected since the probability values of the unit root test statistics are less than 0.05, we accept the alternative hypothesis and thus conclude that there is no presence of unit root in the series. In addition, evidence from the results further foretold that the variables were integrated of order I(0) and I(1), and no variable was found to be integrated of order I(2) and above which violates the tenets of ARDL assumptions.

The next step is to examine if there is an existence of a long-run relationship between money market instruments and price stability in Nigeria. We utilized the ARDL bound test for this purpose, which involves comparing calculated F-statistics with the 1% upper critical values of Pesaran et al. (2001) and Narayan (2004), if the F-statistics are greater, then there is the existence of a long-run relationship between the variables under testing, if the F-statistics is lower, it implies that there is no long-run relationship between the variables under testing. Thus, the result of the ARDL bound test for examining the relationships between money market instruments on price stability is presented in table 3 below.

TABLE 3: ARDL LONG-RUN BOUND TEST

	F-Statistics	**K**	**Pesaran et al. (2001)**						**Narayan (2004)**					
			1%		5%		10%		1%		5%		10%	
			I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
Model 1	82.84630	6	3.74	5.06	2.86	4.01	2.45	3.52	4.59	6.37	3.28	4.63	2.70	3.90
Model 2	7.960061	6	3.74	5.06	2.86	4.01	2.45	3.52	4.59	6.37	3.28	4.63	2.70	3.90

Source: Computed

Evidence from the result entailed that there is the existence of a long-run relationship between money market instruments and price stability in Nigeria since the F-statistics for models 1 and 2 are greater than the 1% upper critical values of both Pesaran et al. (2001) and Narayan (2004). The money market and its instruments are very beneficial for business firms to thrive in Nigeria. It creates a mechanism that allows for firms, companies, corporate bodies, governments, and individuals with temporal surplus cash to invest in short-term securities. It also allows them to

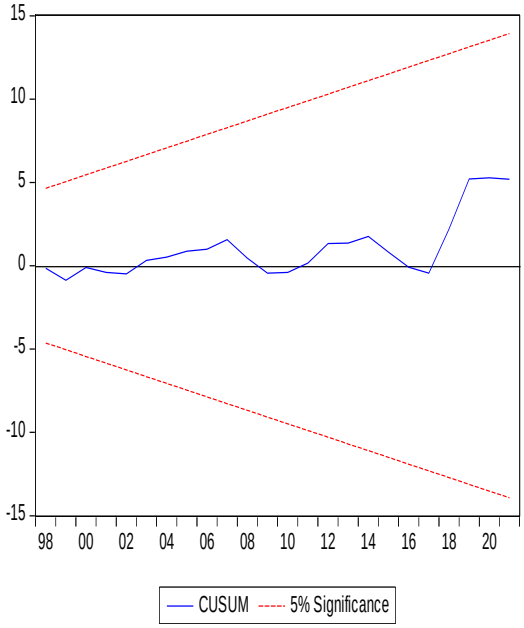
sell their securities or borrow funds on a short-term basis. Money market instruments are highly liquid due to their short-term maturity durations, thus, the prices of the instruments are not often stable, since they are greatly affected by the market forces of demand and supply.

This study further tested the stability of the variables during the study period by employing the ARDL recursive CUSUM and CUSUMSQ graphs. The CUSUM and CUSUMSQ tests for parameter stability as first introduced into the statistics and econometrics literature by Brown et al. (1975). The tests are aimed at measuring the stability of model variables in the estimated period. The decision rule for the test is that if the bound curve line remains within the 5% critical bounds of the graph, it means that the variables were stable, and if not, the variables are unstable during the period of the study. It was discovered from fig. 1 below that the variables of the models in Nigeria are stable since the critical lines of both Cusum and Cusumsq graphs lie within the 5% critical bounds of the graphs.

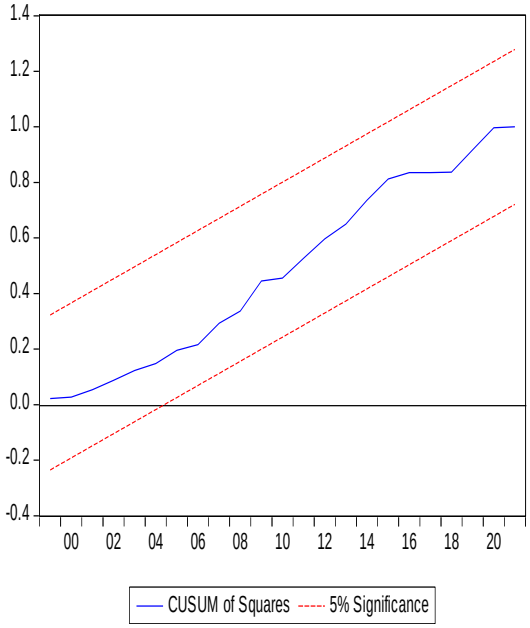
Fig. 1: Summary of CUSUM and CUSUMSQ Results

Model 1:

CUSUM

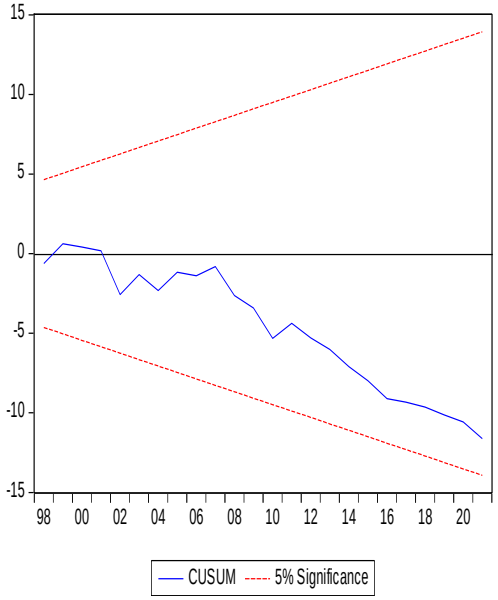


CUSUMSQ

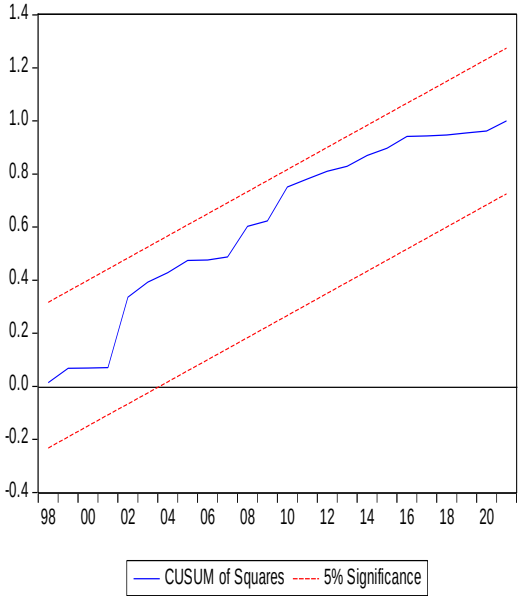


Model 2:

CUSUM



CUSUMSQ



Source: Author's Computation

Furthermore, we investigate if long-run relationships exist between money market instruments and price stability in Nigeria with the dynamic ARDL bounds testing approach. However, indicators such as Treasury Bills (TB), Discount Windows (DCW), Mutual Funds (MTF), and Risk Premium Lending – RPL (lending rate minus Treasury bill rate %) were used to measure money market instruments; while consumer price index (CPI) and Gross Domestic Product Deflator (GDP-Deflator), were used to measure price stability and the control variables are inflation rate (INFR) and Exchange Rate (EXR). To satisfy the basic assumptions of the classical linear model, the specified models were taken through some econometric tests such as Normality, serial correlation, Ramsey Reset, and White Heteroscedasticity tests, and findings from the results obtained showed that the error terms of the specified models are normally distributed, serially uncorrelated and homoscedastic, and the models are correctly specified (see table 4) below.

Table 4: Results for Estimated ARDL Results

	Mosel 1 **Dep. Var.: CPI**	**Model 2** **Dep. Var.: GDP_Deflator**
Lag. Dep. Var.	1.088050*** [0.027794] {39.14705} (0.0000)	0.367258*** [0.020250] {17.91502} (0.0000)
LnTB	-0.927843*** [0.031406] {-29.54349} (0.0000)	0.487006*** [0.110573] {4.404392} (0.0002)
LnDCW	-2.685805*** [0.104705] {-25.65116} (0.0000)	0.002250*** [0.000210] {10.70236} (0.0000)
LnMTF	-0.008628*** [0.000673] {-12.82020} (0.0000)	0.013995*** [0.001962] {7.134336} (0.0000)
LnRPL	-0.250782*** [0.079536] {-3.153062} (0.0005)	0.347538*** [0.048919] {7.104356} (0.0000)
LnINF	0.089662*** [0.035432] {2.530555} (0.0184)	-0.920834*** [0.125957] {-7.310701} (0.0000)
LnEXR	0.523606*** [0.020423] {25.63805} (0.0000)	0.090899*** [0.010179] {8.930050} (0.0000)
No of obs.	31	31

Normality	30.60200 (0.0000)	85.60659 (0.0000)
Serial Correlation	3.883775 (0.1359)	0.914461 (0.4154)
Ramsey	0.673134 (0.0000)	0.045644 (0.0000)
Heteroscedasticity	2.388344 (0.3380)	0.316101 (0.9423)

Source: Computed. Note: [.] represents the standard error; {.} represents t-statistics; (.) represents probability values; and ***, ** and * 1%, 5% and 10% level of significance.

Findings entailed that there is an existence of long-run between money market instruments and price stability in Nigeria. Findings from model 1 suggest that negative but significant relationships exist between treasury bills, discount windows, mutual funds, risk premium lending, and price stability in Nigeria, while inflation rate and exchange rate portrayed a positive relationship with price stability in Nigeria.

However, the reverse is the case in model 2. It was discovered that a long-run positive relationship exists between treasury bills, discount windows, mutual funds, exchange rate, and risk prime lending; while the inflation rate has a negative relationship with price stability. Thus, this study found that negative long-run relationships exist between money market instruments and price stability in Nigeria in model 1. Provision of short-term funds to investors, individuals, business firms, and governments at a reasonable price remains the basic function of the money market instruments. Money market instruments enable lenders to turn their idle funds into an effective investment and aid borrowers to get needed funds to boost their investment needs. The money market has become a principal source, where assets are involved in short-term borrowing, lending, buying, and selling with the original maturity of one year or less. It provides liquidity for the global financial system such as capital markets, which are part of the broader system of financial markets.

These mixed outcomes in the long-run successive component of the ARDL models could be result of weak institutional quality in Nigeria. Following the most recent ranking, Nigeria was ranked 102 out of 104 in terms of institutional quality (Prosher, Investigative Intelligence). In the like manner, the level of governance, rule of law, and corruption index are very poor. Nigeria's share in the governance index is 103 out of 104 countries examined; in terms of the rule of law Nigeria has ranked 121 out of 139 countries, and 154 out of 180 countries in the corruption index (World, Bank's World Governance Indicators). Thus, the aforesaid factors among others are militating against price stability in Nigeria, therefore, the government should make policies that will improve the stability of prices of goods and services, especially money market instruments through economic stabilization. These findings align with previous empirical studies (see Akarara and Edoumiekumo 2018; Etale and Ayunku 2017; Eze and Mansi; Faith et al. 2020; Kimberly 2022; Umanson 2018; and Uruakpa 2019) among others.

Table 5: Estimated Results for Short-Run Dynamics

	Mosel 1 Dep. Var.: CPI	Model 2 Dep. Var.: GDP_Deflator
ECM(-1)	-0.088050*** [0.027794] {-3.167974} (0.0041)	-0.632742*** [0.220250] {-2.872843} (0.0084)
ΔLnTB	-0.027843 [0.031406] {-0.886538} (0.3841)	0.487006*** [0.110573] {4.404392} (0.0002)
ΔLnDCW	-0.000027 [0.000057] {-0.469720} (0.6428)	0.002250 [0.562123] {0.004002} {0.4587)
ΔLnMTF	-0.000628 [0.000673] {-0.932975} (0.3601)	0.013995*** [0.001962] {7.134336} (0.0000)
ΔLnRPL	-0.250782 [0.179536] {-1.396831} (0.1752)	0.347538 [0.348919] {0.996043} (0.3292)
ΔLnINF	0.089662** [0.035432] {2.530555} (0.0184)	-0.120834 [0.255957] {-0.472088} (0.6411)
ΔLnEXR	0.023606 [0.020423] {1.155858} (0.2591)	0.020899 [0.010179] {2.053259} (0.0511)

Source: Computed. Note: [.] represents the standard error; {.} represents t-statistics; (.) represents probability values; ***, ** and * 1%, 5% and 10% level of significance and Δ shows that the variables are expressed in natural logarithm.

In the short run, the coefficients of the error correction model possess negative signs and are statistically significant, thus, implying that there is an existence of short-run relationships between money market instruments and price stability in Nigeria. The results finding further show that the speed of adjustments from the short-run to the long-run for models 1 and 2 are 8% and 63% respectively. This implies that it will take about -0.088050 and -0.632742 changes to regulate from the short run to the long run. These findings are related to previous empirical findings made by (Faith et al. 2020; Kimberly 2022; Umanson 2018; and Uruakpa 2019) among others.

These mixed findings arise due to poor regulatory quality, poor level of good governance, and high corruption index which affects the economic policies, monetary and fiscal policy which in turn affects the price levels of all goods and services in Nigeria. Conclusively, this study concludes that a negative long-run relationship exists between money market instruments and price stability in Nigeria. This finding aligned with the findings of some notable scholars – Akarara and Edoumiekumo (2018), Onodugu et al (2017) Faith et al. (2020), and Eze and Ayunku (2017) one hand, yet their findings differ in terms of objectives, estimation techniques employed, and findings made. Akarara and Edoumiekumo (2018) used ARDL bound testing approach in a similar study and found the existence of a long-run relationship between the money market and economic growth in Nigeria; Faith et al. (2020) found that a positive relationship exists between money market instruments and economic growth; while Eze and Ayunku (2017) found from the parsimonious error correction results show that the money market has a significant impact on the Nigerian economy. None of the studies considered price stability, rather, they focused on examining the links between money market instruments and economic growth in Nigeria. In conclusion even though the result of the robustness check, which measures the long-run relationship between GDP-Deflator and money market instruments show that positive long-run relationship exists between them, however, this present study found a negative and significant long-run relationship between money market instruments and price stability in Nigeria as consumer price index is the main measure of inflation in Nigeria.

6. Summary, Recommendation, and Conclusion

This study aim is to evaluate the impact of money market instruments on price stability in Nigeria from 1990 to 2021 using indicators such as Treasury Bills (TB), Discount Windows (DCW), Mutual Funds (MTF), and Risk Premium Lending – RPL (lending rate minus Treasury bill rate %) to measure money market instruments; consumer price index (CPI) and Gross Domestic Product Deflator (GDP-Deflator), to measuring price stability and inflation rate (INFR) and Exchange Rate (EXR) as the control variables. Findings from the ARDL bound test show how long-run relationships exist between money market instruments and price stability in Nigeria. Relatedly, the results of the CUSUM and CUSUMSQ graphs show that there is no instability in the variables from 1990 to 2021. In addition, the findings of the ARDL result show that negative long-run relationships exist between money market instruments and price stability in Nigeria, where the results of the short-run dynamic show that the speed of adjustments from the short-run to the long-run is corrected by the magnitude of 8% and 63% respectively. This study found that negative long-run and significant relationships exist between money market instruments and price stability. Thus, economic stabilization policies, and institutional and governance quality should be improved in Nigeria to ensure that prices of goods and services and monetary instruments are stabilized.

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