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Impact of Monetary Policy on Small Scale Enterprises Financing in Nigeria

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Abstract

Small and Medium Scale Enterprises play vital roles in the economy which are usually instrumental in achieving macroeconomic goals. This has attracted the attention of monetary authorities to institute policiesto boostconducive environment for SMEs to thrive. This study therefore empirically investigates the impact of monetary policy on SMEs financing in Nigeria spanning from the first quarter of 1992 to the last quarter of 2016. The time series data were subjected to unit root test to ascertain the stationarity of the variables and thereafter, cointegration and Error Correction Model (ECM) technique were used for the analysis. The residuals of the analysis were further subjected to various diagnostics tests. The result revealed that interest rate has a positive and significant impact on the SMEs financing in Nigeria. On the other hand, inflation rate was found to have a significant but negative impact on SMEs financing in Nigeria. Money supply and exchange rate were found to be insignificant in impactingSMEs financing. Based on this finding, the study recommends that, monetary authorities should give special attention to SMEs in specific sectors by creating special windows through various financial institutions to grant low interest rate so as to grant SMEs access to funds.This will boost business growth and consequently achieve macroeconomic goals.

Keywords: Monetary Policy, SMEs, Interest rate, Inflation rate, Exchange rate, ECM.

1. Introduction

The importance of Small and Medium Enterprises (SMEs) globally cannot be overemphasized. SMEs cuts across various sectors of the economy such as manufacturing, agriculture, and financial services as well asInformation and Communication Technology (ICT).They serve as a source of livelihood for many and providing jobs for the yearning unemployed populace. More so, SMEs are pivotal in driving innovative and technological processes, which stimulates the economy for growth and development. This has continued to attract governments' attention all over the world to institute measures and policies to stimulate various stakeholders to embrace the idea of venturing into SMEs.

According to Small and Medium Enterprises Development Agency of Nigeria (SMEDAN) (2014) findings on

SMEs in developing countries, indicated that countries with large share of SMEs employment, have higher economic growth than their counterparts. In fact, it is suggested that one of the significant characteristics of a flourishing and growing economy is a booming MSMEs sector. SMEs therefore, plays an important role in the economic development of a country in the areas of employment creation for rural and urban growing labor force, providing desirable sustainability and innovation in the economy as a whole.In addition to that, a large number of people rely on the SMEs directly or indirectly. Most of the current larger enterprises in Nigeria and indeed in the world have their origins in SMEs.

Despite this vital roles played by SMEs, the Organisation for Economic Co-operation and Development (OECD) (2009), opined that access to financing continues to be one of the most significant challenges for the creation, survival and growth of SMEs especially innovative ones. Adelaja (2003) noted that SMEs suffer acute capital formation and are more financially constrained than large firms in sourcing for credit from formal credit institutions such as banks. Similarly, Rocha, Farazi, Khouri, and Pearce (2011) stressed that despite the increasing interest in SMEs sector, lending volume are still not very impressive. Central Bank of Nigeria (CBN) (2005) observed that banks have been experiencing aggregate credit growth to the domestic economy, yet the ratio of loan supply to SMEs has continued to decrease over the years. One of the development roles of the monetary authorities is to facilitate the flow of funds to the deficit economic units.

According to Kashyap and Stein (1994) monetary policies affect the real sector through the assets in the balance sheets of the banks. That is, the banking sector is given the function of creating credits in additions to creating money. According to Nto, Mbanasor and Osuala (2012) the central bank uses monetary policy variables to exercise strict controls over the supply of money in the economy, the rate of interest chargeable to borrowers of credit, amongst which are the SMEs. Also, the exchange rate affects the prices at which SMEs are able to get essential supplies such as raw materials from foreign countries for their productive and innovative activities and CBN policy targets is to ensure a stable exchange rate for more investments to be possible by SMEs.

Nto et al. (2012) noted that despite all the special interventions by the CBN to induce banks credit supply to SMEs, the reverse seems the case as evidenced by reports of CBN (2010) that the percentage of total credit to SMEs still fell from 48.8% in 1992 to 9.0%, 8.6% and 2.7% in 2000, 2002 and 2005 respectively. Various monetary policy theory put forward by the classical school of thoughts, Keynesians and the credit channel posits that monetary policy variables influence the private sector of the economy.It is therefore important to ascertain the extent to which monetary variables impacts SMEs financing in Nigeria. They are dearth of empirical literatures in this regard, as most studies in Nigeria focuses on the impact of commercial bank credit on SMEs (Uremadu, Ani&Odili, 2014; Ayuba&Zubairu, 2015; and Uzonwanne, 2015). This study therefore, employs the monetary policy strategies (money supply, interest rate, inflation rate and exchange rate) used by the CBN in driving its monetary policy and how they impact on SMEs financing in Nigeria.

The main objective of this study is to empirically investigate the impact of monetary policy on SMEs financing in Nigeria spanning over the first quarter of 1992 to the last quarter of 2016.

2. Statement of Hypotheses

The following hypotheses will be tested in this study:

H_{01}: Money supply has no significant impact on SMEs financing in Nigeria.

H_{02}: Interest rate does not have any significant impact on SMEs financing in Nigeria.

H_{03}: Inflation rate has no significant impact on SMEs financing in Nigeria.

$H_{04:}$ Exchange rate does not have any significant impact on SMEs financing in Nigeria.

3. Literature Review and Theoretical Framework

In economic policy framework, different approaches are often adopted to review economic conditions and set

targets for achieving certain objectives. One of such policies is the monetary policy. In Nigeria, CBN is mandated by the CBN act of 1958 to promote and maintain monetary stability and a sound financial system in country (Chuku, 2010). Just like any other apex bank, the CBN has the responsibility of achieving price stability and sustainable economic growth through monetary policy. CBN, (2011, p4) defined monetary policy as a deliberate action of the monetary authorities to influence the quantity, cost and availability of money credit, in order to achieve desired macroeconomic objectives of internal and external balances. The action here involves regulating money supply and/or interest rates with the aim of managing the quantity of money in the economy.

The apex bank adopts various strategies of monetary policy in modifying the amount of money in circulation. The distinction between the different strategies of monetary policy lies primarily with the set of instruments, targets and variables that are used by the monetary authorities to achieve desired objectives. According to CBN (2011), the strategies of monetary policy in Nigeria include monetary targeting, interest rate targeting, inflation targeting, gross domestic product targeting and exchange rate targeting. Therefore, the monetary policy variables adopted for this are money supply, interest rate, inflation rate and exchange rate.

Small and Medium Enterprises Development Agency of Nigeria (SMEDAN) (2014) defined SMEs by classifying them into size, sector, organization, technology and location. The reason for this is because; these variables interact with one another in complex ways which must be taken into consideration in other to understand the nature, characteristics, performance, problem and challenges of business enterprises. SMEDAN (2014) defined SMEs based on the following classifications: Micro Enterprises are those enterprises whose total assets (excluding land and buildings) are less than Five Million Naira with a workforce not exceeding ten employees. Small Enterprises are those enterprises whose total assets (excluding land and building) are above Five Million Naira but not exceeding Fifty Million Naira with a total workforce of above ten, but not exceeding forty-nine employees.Medium Enterprises are those enterprises with total assets excluding land and building) are above Fifty Million Naira, but not exceeding Five Hundred Million Naira with a total workforce of between 50 and 199 employees.

3.1 Empirical Studies

They are dearth of literatures on monetary policy and SMEs in Nigeria. However, a number of studies have been carried out on the impact of commercial banks credit to SMEs. In this study few empirical studies are reviewed to examine the impact of different monetary policy variables on SMEs financing. For example, Mohammed (2014) examined the necessity and strategies of re-positioning commercial banks in order to enhance the productive capacities of SMEs employing the Error Correction Model (ECM) and Co-integration test.The results showed that there was co-integration between re-positioning of commercial banks and capacities of SMEs to deliver services and also a significant dispersion resulting from lending conditions and macroeconomic variables. He argued that relaxing the conditions for lending offered by the banks through the apex bank, prioritizes the SMEs in order to contribute to economic growth.

Ovat, (2016) examined the role played by commercial banks' credit in facilitating the growth of SMEs in Nigeria. The study adopted co-integration and error correction mechanisms and based on the findings, exchange rate and lending rateare statistically significant to SMEs credit. Also, inflation rate was found to be significant but negative to SMEs credit. He opined that SMEs should be made to have easy access to credits from commercial banks.In order to achieve this, the monetary authority should ensure that the lending rate at which commercial banks lend to the SMEs is reduced to the barest minimum.More so, devaluation of the national currency should not be encouraged as devaluation makes the cost of imported raw materials and capital goods used by the SMEs very expensive and hence impedes their production, rather local sourcing of raw materials should be encouraged to reduce the pressure on exchange rate.

Anigbogu, Okoli and Nwakoby (2015) investigated the effect of financial intermediation on small and medium enterprises performance in Nigeria between 1980-2013.Using an econometric model of the Ordinary Least Square (OLS). Findings revealed that with the exception of bank interest rate to SMEs, all other variables namely bank lending rate to SMEs, exchange rate and monetary policy have a positive and significant influence on small and medium enterprises performance in Nigeria.

Imoughele and Ismaila (2014) employed Co-integration and Error Correction Modelling (ECM) techniques to investigate the impact of commercial bank credit on Nigeria's SMEs between 1986 and 2012.The results revealed that SMEs and selected macroeconomic variables included in the model have a long run relationship with SMEs output. The study also reveals that savings time deposit and exchange rate have significant impact on SMEs output in Nigeria. The study also showed that interest rate has adverse effect on SMEs output.

Dada (2014) investigated the effect of commercial banks' credit on SMEs development employing Ordinary Least Square (OLS) technique to estimate the multiple regression models. The findings revealed that commercial banks credit to SMEs and the saving and time deposit of commercial banks exert a positive and significant influence on SMEs development.While exchange rate and interest rate exhibit adverse effect on SMEs development.

Suleyman (2013) examined the monetarypolicies of the Central Bank of the Republic of Turkey on SMEs credit between 2003-2011.Results shows that money supply has a strong effect for manufacturing sector credit volume. Also, result shows that increase in the credit volume of large enterprises does not have any effect on the credit volume for SMEs. On the contrary, as credit volume of SMEs increases, credit volume of large enterprises decreases, which reveals a reverse causality between credit volume tendencies of different size firms.

Olukayode and Somoye, (2013) evaluates the impact of finance on entrepreneurship growth in Nigeria using endogenous growth framework, the results showed that finance and interest rate, significantly impacted on entrepreneurship in Nigeria. They argued that the formulation of effective macroeconomic policy targeted to entrepreneurship financing and growth is necessary and also, monetary authorities should intervene indirectly by reducing Monetary Policy Rates (MPR) which will directly reduce the transaction costs of funds to industrial sectors.

Nto et al. (2012) examined the influence of monetary policy variables on banks' credit supply to SMEs in Nigeria. Time series data which were collected on quarterly basis covering a period of 1995-2010 and were analyzed using Fully Modified Least Squares (FMOLS). The results indicated that policies on interest rate and liquidity ratio were negatively and positively significant to SMEs.

This study is underpinned by the classical theory, Keynesian theory and credit channel theory. These theories explains the competition of loanable funds available in the economy and that changes in monetary policy tends to decrease or increase the ability of private sector to access funds for investment. An understanding of the changes in monetary policy variables brought about by the apex bank affects credits by banks. A tighter monetary policy causes banks to discourage access to funds by SMEs while an expansionary monetary policy give SMEs access to bank funds. In practice, SMEs responds to the opportunities available in the economy in its interaction with monetary policy. Therefore, there are abstractions from all the above theories that will be found to be true in specific instances.

4. Research Methodology

The study adopts ex-post facto research design. Quarterly secondary data were used for this study spanning from 1992:1 – 2016:4 which were sourced from CBN statistical bulletin. In testing the formulated hypotheses, the use of econometric techniques was employed which includes: unit root test to test for stationarity in the variables and cointegration test was used to examine the long run relationship between the dependent variable and the

independent variable before running the Error Correction Mechanism (ECM) with the aid of Eviews 8.0.

4.1 Model Specification

The study employed multiple regression in examining the impact of monetary policy on SMEs financing in Nigeria.The model comprises monetary policy variables which are strategies used by monetary authorities to influence the real sector of the economy. The dependent variable for the study is SMEs financing (SMEsFin) (proxy by commercial bank loans to SMEs) while the explanatory variables includes: money supply (M2), interest rate (IR), inflation rate (INFLR) and exchange rate (EXR). Therefore, the multiple regression model is specified as follows:

$$SMEsFin_t = \beta o + \beta_1 M2_t + \beta_2 IR_t + \beta_3 INFLR_t + \beta_4 EXR_t + \varepsilon \quad (1)$$

5. Results and Discussions

In order prevent spurious regression, the variables were subjected to stationarity test using Augmented Dickey Fuller (ADF) test. The ADF test are based on the null hypothesis of non-stationarity and failure to reject the null implies rejection and the need for appropriate differencing to induce stationarity.

Table 1: Unit Root Test

Variables	ADF Statistics	1%	5%	10%	Order of integration
LogSMEsFin	-7.389386	-3.653730	-2.957110	-2.617434	I(1)
LogM2	-5.377029	-3.653730	-2.957110	-2.617434	I(1)
IR	-5.310906	-3.679322	-2.967767	-2.622989	I(1)
Inflr	-3.730850	-3.653730	-2.957110	-2.617434	I(1)
EXR	-5.811488	-3.653730	-2.9557110	-2.617434	I(1)

Source: Eview Output (2018)

Table 1 shows the stationarity test results which was carried out to test the presence of unit root which was tested at 5% Mackinnon critical value. This study employed ADF because, the ADF test is conducted by augmenting the preceding three equations by adding the lagged values of the dependent variable, the idea being to include enough terms so that the error term is serially uncorrelated (Gujarati, 2004). From our analysis, all variables were found to be stationary at first difference.

5.1Cointegration Test

Johansen cointegration was conducted to test the existence of a long run relationship among the variables. Prior to that conducting the cointegration test, we first ascertain the optimal lag length criteria for the variables using Akaike Information Criterion (AIC), Schwarz Information Criterion (SC) and Hannan-Quinn Information Criterion (HQ) criteria and it was found that 1 lag is more suitable for our analysis (See appendix A)

Table 2: Johansen Cointegration Test

Ranks	Trace Statistics	5% Critical Value
None*	71.26113	69.81889

* denotes rejection of the hypothesis at the 0.05 level

Source: Eviews output (2018)

The cointegration with the trace test reveals 1cointegration equations at 5% level of significance. This implies that there is a long run relationship among the variables and hence, anError Correction Mechanism to explain the short run relationship between the variables would be applied (See appendix B).

5.2 Error Correction Mechanism

In order to explain the short run deviations that may have occurred in estimating the long run cointegration equation and to test the formulated hypotheses, the ECM was conducted. This was done by introducing the error

correction term, which was derived from the long-run equation based on economic theory. The result presented below:

Table 3: ECM Analysis

Variable	Coefficient	t-statistics
D(LOGM2,1)	-0.129602	-0.714792
D(IR,1)	0.012513	2.610405***
D(INFLR,1)	-0.003459	-2.473655***
D(EXR,1)	-7.92005	-0.129786
ECM(-1)	-0.099796	-2.291425**

R^2=68.5%, Adj R^2=64.1%, F-statistics =4.233***

Note: *** ** represent significant level at 1% and 5%

Source: Eview Output, (2018)

The ECM term is in line with our a priori expectation. The negative sign and the statistical significant of the ECM at 1% implies that the speed of adjustment to its long run equilibrium is 9.9%. Thus, the ECM will adequately act to correct any deviations of the short run dynamics to its long run equilibrium by 9.9% quarterly.

The coefficient of determination measured by the R^2 is 0.685 which implies that 68.5% of the total variations in SMEs financing is accounted for by the explanatory variables: money supply, interest rate, inflation rate and exchange rate.While, the remaining 31.5% represents the changes in the dependent variable which was not included in the equation. After adjusting the R^2, the total variation becomes 64.1%. Also, the fitness of the model was tested using the F-statistics which shows that the model is statistically fit as indicated by the significance level of 1%.

5.3 Test of Hypotheses

H01: Money supply has no significant impact on SMEs financing in Nigeria.

The regression result in table 3 shows that money supply has no significant impact on SMEs financing in Nigeria. Based on this result, we therefore accept the null hypothesis because the p value was not significant. The implication of this is that for the period under review, money supply does not impact SMEs financing in Nigeria. This finding is contrary to the apriori expectation and the findings of Suleyman (2013); Imoughele and Ismaila (2014) and Dada (2014) found that money supply positively impacts SMEs financing.

H02: Interest rate does not have any significant impact on SMEs financing in Nigeria.

Table 3 also shows the result of interest rate and SMEs financing in Nigeria. According to the findings, there exists a significant impact of interest rate on SMEs financing in Nigeria which is evident by the p-value ($p<0.01$). Hence, the rejection of the null hypothesis which states that interest rate does not have any significant impact on SMEs financing in Nigeria and acceptance of the alternate hypothesis which states that interest rate significantly impacts SMEs financing in Nigeria. This finding is contrary to the findings of Nto et al (2012) and Dada (2014) who found that increase in interest rate negatively affects SMEs financing. However, the findings of this study conforms to the findings of Olukayode and Somoye (2013) and Ovat (2016) who found that increased interest rate, increases credit to SMEs. This means that when monetary authorities increase interest rate, banks tend to extend more credits to SMEs in order to make more profits.

H03: Inflation rate has no significant impact on SMEs financing in Nigeria.

Table 3 also shows the result of inflation rate and SMEs financing in Nigeria. According to the findings, inflation rate significantly but negatively impacts SMEs financing in Nigeria which is evident by the p-value ($p<0.01$). Hence, the rejection of the null hypothesis which states that inflation rate has no significant impact on SMEs

financing in Nigeria. This finding is in line with the apriori expectations because increased inflation rate negatively affects cost and availability of funds to SMEs as monetary authorities tend to put inflation under check by increasing the interest rate to force the inflation rate down.Ovat (2016) also found a negative and significant impact of inflation rate on SMEs financing.

H04: Exchange rate does not have any significant impact on SMEs financing in Nigeria.

The fourth hypothesis which states exchange rate does not have any significant impact on SMEs financing in Nigeria was accepted. According to the findings in table 3, there exists no significant impact of exchange rate on SMEs financing in Nigeria for the period under review which is evident by the p-value ($p>0.05$). This findings is contrary to the apriori expectations and the findings of Dada (2014) who found a significant and negative impact of exchange rate on SMEs financing, While Ovat (2016) found a significant and positive impact of exchange rate on SMEs financing and argued that continuous depreciation of naira makes imported goods to be expensive and unattractive thereby reducing foreign competition and boosting production of local goods by SMEs in Nigeria.

5.4 Diagnostic Tests

The residuals of the analysis were subjected to various diagnostic test. This is necessary to fulfil the assumptions of the result. They include:

5.4.1 Normality Test

In order to test if the residuals of theanalysis are normally distributed, the Jarque-Bera test statistic was employed. The test statistic measures the difference of the skewness and kurtosis of the series with those from the normal distribution. Appendix D showed the outcome of the Jarque-Bera test and its corresponding p-values. The result shows that the Jarque-Bera value for our model is significant at 1% level resulting in the rejection of the null hypothesis which states that our model are normally distributed.

5.4.2 Serial Correlation Test

The residuals of the regression equation were subjected to the test of serial correlation using Breusch-Godfrey serial correlation LM test. The null hypothesis was tested which stated that there is no serial correlation. This was necessary because, serial correlation in the residuals will lead to incorrect estimates of the standard error and invalid statistical inference for the coefficients of the equation. From our analysis, the null hypothesis for the model was accepted.Hence, no problem of serial correlation (See appendix E).

5.4.3 Heteroskedasticity Test

One of the statistical assumptions of the OLS is that the error terms for all observations have a common variance (homoskedastic). On the contrary, varying variance errors are said to be heteroskedatic. The heteroskedasticity was tested in the residuals of the estimations using the Autoregressive Conditional Heteroskedasticity (ARCH) test developed by Engle (1982). Ignoring the ARCH effect on the residuals of time series may result in the loss of efficiency of the estimators. The null hypotheses are stated as there is no heteroskedasticity. From our analysis, the models had no heteroskedasticity. Hence, we could not find reasons to reject the null hypotheses because they were insignificant at 1%, 5% and 10%. (See appendix F)

6. Conclusion and Recommendation

The main objective of this study is to empirically investigate the impact of monetary policy on SMEs financing in Nigeria spanning over the first quarter of 1992 to the last quarter of 2016. Econometric model was specified and estimated using ECM to ascertain the impact of the independent variable on the dependent variable. The variables were first tested for stationarity using ADF and all variables were found to be I(1). Thereafter, cointegration analysis was carried out to determine the long run relationship among the variables which revealed that there exists a long run relationship between the variables. ECM test was performed and the findings revealed that the speed of adjustment to its long run equilibrium was corrected at 9.9%. In testing the hypotheses, the

findings showsthat money supply and exchange rate does not impact SMEs financing. Also, interest rate was found to have a significant and positive impact on SMEs financing while inflation rate had a significant by negative impact on SMEs finance in Nigeria. Also, the residuals of the analysis were subjected to various diagnostic tests such as Jarque-Bera test of normality. Bruesch-Godfrey test of serial correlation which shows that the variables have no problem of serial correlation, ARCH test of Heteroskedasticity shows that there was no heteroskedasticity in the variables.Based on the findings; the following recommendations are put forward:

- Monetary authorities should give special attention to SMEs in specific sectors by creating special windows through various financial institutions to grant low interest rate loans, so as togive SMEs access to funds. This willboost business opportunities and consequently achieve macroeconomic objectives.
- Based on the findings, inflation rate was found to be negatively significant to SMEs financing. This is evidence in the inflation data of Nigeria, which has continually recorded double digits most especially in recent years. Monetary authorities should employ various monetary tools such as the policy rate to steer the inflation rate downward. This will help boost local SMEs productivity.

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Appendices

Appendix A: Lag Length Criteria

VAR Lag Order Selection Criteria

Endogenous variables: EXR INFLR IR LOGM2 LOGSMESFIN

Exogenous variables: C

Date: 05/30/18 Time: 14:53

Sample: 1992Q1 2016Q4

Included observations: 96

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1113.066	NA	8988.044	23.29303	23.42659	23.34702
1	-575.0197	1008.836	0.205154*	12.60458*	13.40594*	12.92850*
2	-566.7047	14.72449	0.291665	12.95218	14.42134	13.54604
3	-551.4689	25.39299	0.361285	13.15560	15.29256	14.01939
4	-503.7083	74.62584*	0.229459	12.68142	15.48618	13.81515

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Appendix B: Johansen Cointegration Test

Date: 05/30/18 Time: 14:54

Sample (adjusted): 1992Q4 2016Q4

Included observations: 97 after adjustments

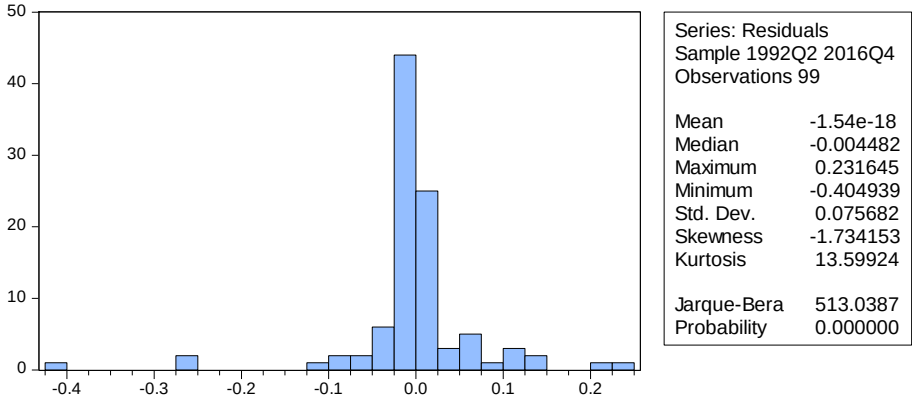
Trend assumption: Linear deterministic trend				
Series: EXR INFLR IR LOGM2 LOGSMESFIN				
Lags interval (in first differences): 1 to 2				
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		**Trace**	**0.05**	
No. of CE(s)	**Eigenvalue**	**Statistic**	**Critical Value**	**Prob.****
None *	0.353078	71.26113	69.81889	0.0382
At most 1	0.143519	29.01475	47.85613	0.7676
At most 2	0.095765	13.98720	29.79707	0.8413
At most 3	0.037686	4.222631	15.49471	0.8848
At most 4	0.005105	0.496456	3.841466	0.4811
Trace test indicates 1 cointegratingeqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.353078	42.24638	33.87687	0.0040
At most 1	0.143519	15.02755	27.58434	0.7460
At most 2	0.095765	9.764571	21.13162	0.7664
At most 3	0.037686	3.726175	14.26460	0.8871
At most 4	0.005105	0.496456	3.841466	0.4811
Max-eigenvalue test indicates 1 cointegratingeqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Appendix C: ECM Result

Dependent Variable: D(LOGSMESFIN,1)				
Method: Least Squares				
Date: 05/30/18 Time: 14:33				
Sample (adjusted): 1992Q2 2016Q4				
Included observations: 99 after adjustments				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	0.000983	0.008789	0.111825	0.9112
D(LOGM2,1)	-0.129602	0.181315	-0.714792	0.4765
D(IR,1)	0.012513	0.004794	2.610405	0.0105
D(INFLR,1)	-0.003459	0.001398	-2.473655	0.0152
D(EXR,1)	-7.92E-05	0.000610	-0.129786	0.8970
ECM(-1)	-0.099796	0.043552	-2.291425	0.0242

R-squared	0.685415	Mean dependent var	-0.003030
Adjusted R-squared	0.641620	S.D. dependent var	0.083854
S.E. of regression	0.077690	Akaike info criterion	-2.213489
Sum squared resid	0.561323	Schwarz criterion	-2.056209
Log likelihood	115.5677	Hannan-Quinn criter.	-2.149854
F-statistic	4.233717	Durbin-Watson stat	1.918199
Prob(F-statistic)	0.001638		

Appendix D: Normality Test



Appendix E: Serial Correlation

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.150756	Prob. F(2,91)	0.8603
Obs*R-squared	0.326935	Prob. Chi-Square(2)	0.8492

Appendix F: Heteroskedasticity Test

Heteroskedasticity Test: ARCH			
F-statistic	0.402363	Prob. F(1,96)	0.5274
Obs*R-squared	0.409031	Prob. Chi-Square(1)	0.5225
Test Equation:			
Dependent Variable: RESID^2			
Method: Least Squares			
Date: 05/30/18 Time: 18:49			
Sample (adjusted): 1992Q3 2016Q4			
Included observations: 98 after adjustments			

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.006083	0.002141	2.841979	0.0055
RESID^2(-1)	-0.064610	0.101857	-0.634321	0.5274
R-squared	0.004174	Mean dependent var		0.005714
Adjusted R-squared	-0.006199	S.D. dependent var		0.020327

S.E. of regression	0.020390	Akaike info criterion	-4.927324
Sum squared resid	0.039913	Schwarz criterion	-4.874569
Log likelihood	243.4389	Hannan-Quinn criter.	-4.905986
F-statistic	0.402363	Durbin-Watson stat	2.008774
Prob(F-statistic)	0.527380		