

Econometrics Analysis of Financial Development and Economic Growth: Evidence from Nigeria

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Abstract

This work explored the relationship between financial development and economic growth in Nigeria. Specifically it investigated the extent to which financial development engenders economic growth. It also verified the existence of supply leading and/or demand following hypotheses in Nigeria. To evaluate these, the researchers firstly determined the stationarity of the variables which informed the use of co integration and then the vector error correction model to finding the long run impact of financial development variables on the growth of the economy. The diagnostic test was employed to determine the authenticity and stability of our model. The researchers also employed the Granger Causality test to investigate the existence of supply leading and/or demand following hypothesis. The results of the analyses show that there is a long run relationship between financial development and economic growth in Nigeria and that besides the metric for banking system financing of the economy variable which is significantly inadequate, all other financial development indicators engender economic growth. Our diagnostic test shows that the model is adequate, plausible, and stable. The short run causality test shows bidirectional causality between capital market liquidity or economic volatility and the growth of the economy while market capitalization ratio, broad money velocity and the banking system rate of financing the economy drive economic growth with no feedback effect. On the basis of the findings, the researchers call on the government to articulate reform packages (such that may involve vigorous financial inclusion) capable of enhancing the banking sectors' involvement in the financing of the economy so as to achieve enormous economic growth.

Index terms— financial development, economic growth, supply leading, demand following hypotheses, cointegration,

1 Econometrics Analysis of Financial Development and Economic Growth:

Evidence from Nigeria Godwin Chigozie Okpara[?], A. N. Onoh[?], B. M. Ogbonna[?], Eugene Iheanacho[?] & Iheukwumere Kelechi. J ¥ Abstract-This work explored the relationship between financial development and economic growth in Nigeria. Specifically it investigated the extent to which financial development engenders economic growth. It also verified the existence of supply leading and/or demand following hypotheses in Nigeria. To evaluate these, the researchers firstly determined the stationarity of the variables which informed the use of co integration and then the vector error correction model to finding the long run impact of financial development variables on the growth of the economy. The diagnostic test was employed to determine the authenticity and stability of our model. The researchers also employed the Granger Causality test to investigate the existence

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2 Introduction a) Financial Sector and Economic Growth and

Development the financial sector plays important role in economic growth and development through the process of financial intermediation. The sector's role in influencing the savings-investment process for acceleration of the rate of economic growth and poverty reduction cannot be overemphasized. Robinson (1954) refers financial sector to as the handmaiden of economic development. McKinnon (1973) contended that the financial sector can be more than a handmaiden to the real economy as it is the major driver of economic growth and development especially when it is liberalized. Williams Amaha (1988) added that if financial sector is free, it can provide the necessary fillip for economic growth and development. Levine et al (2000) also asserted that the growth of components of financial intermediation engenders positive growth in the real sector of the economy.

World Bank (2009) asserts that the financial sector is the brain of the economy and that when it functions properly, it allocates resources to the most productive and efficient uses. In the words of Sanusi (2002), well-functioning financial systems are able to mobilize household savings, allocate resources efficiently, diversify risk, enhance the flow of liquidity, reduce information asymmetry and transaction cost and provide an alternative to raising funds through individual savings and retained earnings. The question of whether Nigerian financial system is actually well functioning gives a food for thought. Furthermore, Soludo (2009) maintains that in terms of policy thrust, the banking sector reforms are expected to build and foster a competitive and healthy financial system to support development and to avoid systematic distress.

The stock market on the other hand is vital for the provision of investible funds and requires the participation of the key economic agents whose participation in Nigerian capital market seems passive rather than active. For instance a look at the participants in the stock market reveals that the leading sub-sector on the stock exchange is banking sector which accounts for about 50% of the total equity market capitalization. Each of the other sectors such as breweries and building materials takes a proportion which is at most 10 percent. Engineering technology has 0% of the total market capitalization. Heavy industries especially in the area of technology are virtually inactive or non-existent in the stock market (Onwumere and Modebe, 2007). These heavy industries are the core of industrial production and their products add heavily to the gross domestic product ??NSE Fact Books 2005. Invariably, the non-participation of

3 Year ()

C these core industries in the stock market may have negative implications on the Nigerian stock market development and the economy at large. Schumpeter (1911) posited that financial intermediation through the banking system played a pivotal role in economic development by affecting the allocation of savings thereby improving productivity, technical change and the rate of economic growth. By mobilizing savings from the surplus unit to the deficit unit who are desirous for productive investment, capital inflow are facilitated. The financial markets not only stimulate investments in both physical and human resources but also channel savings to more productive uses by collecting and analyzing information about investment opportunities ??Jalloh, 2009). In the words of Sanusi (2011), Well functioning financial system are able to mobilize household savings, allocate resources efficiently, diversify risk, enhance the flow of liquidity, reduce information asymmetry and transaction costs and provide an alternative to raising funds through individual savings and retained earnings.

Finance is a life wire of every productive activity. Public as well as private sector operators need various financial instruments to enable them invest in short as well as long term investment. The financial market is divided into two -the money market and the capital market. The money market is a market where short term securities are traded while long term securities are traded in the capital market. Included in the money market are financial access that are short term, highly marketable and accordingly possess low risk and high degree of liquidity. The markets facilitate trading in short term debt instruments to meet short term needs of large users of funds. Government raises short term funds from the money market to finance its short term investment. The capital market on the other hand is a market which provides industrial and commercial firms with long term finance for their capital developments. Capital market therefore, adds to the stock of capital and generates capital formation for new investments .

Government raises long term funds from the capital market to finance its long term investment projects such as social overheads like public hospital, construction of roads, airports, public schools, dam construction etc. Corporations issue corporate bonds to finance long term development projects like construction of new plants,

new buildings, new technology and expansion of existing ones while issuing equities to raise additional financial resources for long term investments. Thus wealth creation for economic growth is facilitated by the financial markets.

4 II.

5 Literature Review a) Financial Development and Economic Growth

Patrick (1966) quoted in Isu and Okpara (2013) identified two possible causal relationships between financial development and economic growth. They include demand following hypothesis which sees the demand for financial services as dependent upon the growth of real output and the commercialization and modernization of agriculture and other subsistence sectors. In other words, it posits a unidirectional causation from economic growth to financial development.

In support of supply leading hypothesis, Clarke, (2002) and Jayaratne and Strahan (1996) concluded that banking sector development following deregulation has led to state level economic growth in the U.S. Wadud (2005) in his study of long-run causal relationship between financial development and economic growth for 3 South Asian countries namely India, Pakistan and Bangladesh disaggregated financial system into "bank-based" and "capital market based" categories and by employing a cointegrated vector autoregressive model found that the results of error correction model indicate causality that runs from financial development to economic growth.

Nnanna (2004) using ordinary least square regression technique, concluded that financial sector development does not significantly affect per capital growth of output. Others who used various methods and data to establish a positive and significant relationship and/or causality running from financial development to growth are De Grgor and Guidotti (1995), Guiso, et al (2002), empirical work by Gelb (1989), Ghani (1992), King and Levine (1993), DeGregorio and Giudotti (1995), Levine and Zervos (1996) have all lent support to the supply-leading hypothesis in the case of many developing and developed countries (See Nwezeaku and Okpara, 2014).

Odiambo (2004) investigated the financegrowth nexus in South Africa using cointegration approach and vector error correction model and found out a demand-following response between financial development and economic growth and therefore discredited the supply-leading hypothesis. Guryay et. al (2007) examined the relationship between financial development and economic growth for Northern Cyprus for the period of 1986-2004 and concluded that there was evidence of causality from economic growth to the development of financial intermediaries in Northern Cyprus. Shan, et al (2001) in their study reached a conclusion that economic growth causes financial development in China.

Arestis and Demetriades (1997), using time series analysis, concluded that evidence favors a bidirectional growth. Also Murinende and Eng (1994) found evidence of such bi-directionality in the case of Singapore, while Demetriades and Hussein (1996) also found a feedback effect for 16 developing countries. Demetriades and Hussein (1996), using time series analysis for a study of developing economies also found causality running both ways.

A study of China by Shan et al (2006) not only found a bidirectional causality between financial development and economic growth but also revealed that the Granger causality from economic growth to financial development is stronger than that from finance to growth. Likewise, Luintel and Khan (1999), investigated the finance-growth nexus in a multivariate VAR model and found bidirectional causality between financial development and economic growth in all their sample country. Adelakun (2010) in his study of relationship between financial development and economic growth found that there is a substantial positive effect of financial development on economic growth in Nigeria. Using Granger causality test, he also found that financial development promotes economic growth. Akinlo, Enisan, Egbetunde and Tajudeen (2010), in examining the long run relationship between financial development and economic growth for ten countries in sub-Saharan Africa found that financial development is cointegrated with economic growth. They also added that financial development Granger causes economic growth in Central African Republic, Congo Republic, Gabon and Nigeria while economic growth Granger causes financial development in Gambia. However in Kenya, Chad, South Africa, Sierra Leone and Switzerland bidirectional relationship was established between financial development and economic growth. In their study, Odenira and Udeaja (2010) examined the relationship between financial sector development in Nigeria using Granger Causality and found a bidirectional causality between financial development and economic growth. Bi-directional causality hypothesis has been advocated by Altay and Atgur (2010).

6 III.

7 Materials and Methods

To assess whether financial development impacts and/or drives economic growth (Supply leading) or whether it is economic growth that drives the financial sector (demand following) and leads to aggressive expansion of the financial sector or whether there exists a feedback effect?, the financial market indicators such as capital market liquidity proxied by value of share traded divided by GDP (VST/GDP), market capitalization ratio denoted by market capitalization divided by GDP (MKTCAP/GDP), broad money velocity denoted by broad money supply

divided by GDP ($M2/GDP$) economic volatility represented by credit to private sector over GDP (CPS/GDP), intermediation efficiency indicated by currency outside banks over broad money supply ($COB/M2$) and the metric for banking system financing of the economy which is proxied by demand deposit over narrow money supply ($DD/M1$) are presented in table 4.1.

The researchers therefore posit the following hypotheses stated in null form as follows:

Ho 1 : Financial development does not exert positive and significant impact on economic growth.

8 Ho 2 : Financial development does not drive economic growth

To assess these hypotheses, the researchers employed cointegration and error correction model as there are seen appropriate for impact determination. Also the Granger causality test was used for causality test.

It must have to be noted that one thing drives or predicts another must not be seen as leading the later to a fortune. Something can be led to a misfortune, in such a situation, the leader or driver has driven it/him to a wrong direction. It is on this note that Granger causality has failed to indicate the desired direction of a particular economic variable. To augment or authenticate Granger causality, the direction of any variable on another must have to be determined through a well built and tested model to avoid recommending a causal relationship that will be detrimental to economic policy. This argument can be justified by the fact that a variable say X can be found to be negatively related to the dependent variable Y yet such a variable X will be found to granger cause Y with no feedback effect. The question of the direction the variable X is driving Y must be of concern. Thus, the researchers diligently tested the parameters of the variables in order to determine the significance of the magnitude of each of the variables as well as exploring their direction.

IV.

9 Estimation and Analysis of Data

The relevant data presented in table 4.1 are estimated and analyzed in lieu of the stated objectives and hypothesis. From the above table, the ADF statistics of all the series are more negative than their 1 percent critical values and far more than that of 5 percent at first difference. This implies that the series are differenced once for them to be stationary. They are therefore said to be integrated of order one. This being the case, the researchers resorted to testing for cointegration between the variables and found that there are three cointegrating equations in the series which invariably suggest the existence of long run relationship between the GDP series and the financial market indicators in Nigeria. The result of the cointegration test is presented in table 4.3 below.

10 Table 4.3: Cointegration Test for GDP-Financial Development Data

The existence of cointegrating equations formed the basis for the researchers' use of the error correction model. The parsimonious result of the error correction model is shown in table 4.4 as follows.

11 C

The results of the analysis show that past GDP at lags 3 and 4 reinforces the present GDP. In other words, increase in past GDP leads to increase in the present value of GDP. The intermediation efficiency indicator ($COB/M2$) is negative and significant at its immediate past level indicating that the rate at which the financial sector intermediates in the economy seems to initially impose untold hardship. However as time passes by, the intermediation efficiency increases and exerts positive impact on the economic growth. The broad money velocity ($M2/GDP$) is positive and significant while the metrics for banking system financing of the economy ($DD/M1$) is negative and significant implying that the banking sector financing of the economy is significantly inadequate to engender growth of the economy. The Stock market liquidity (VST/GDP) for the first lag is negative and significant suggesting that significant illiquidity which hampers the growth of the economy exists in the capital market at lag 1. However, this anomaly corrects as time passed by as the market liquidity exerts positive impact on the growth of the economy at lag 4. Economic volatility (CPS/GDP) and market capitalization ratio (MKT/GDP) are positive and significant. From these findings, the researchers adduced that the financial market activities generally impact economic growth. To accept this model, we embarked on second order econometric tests namely serial correlation test, multicollinearity test using the condition index criteria, heteroskedasticity test, normality test and Model adequacy test. The serial correlation LM test is presented in table 4.5 as follows: The LM test accepts the hypothesis of no serial correlation up to order 2. Implying that the residuals are not serial correlated and the equation therefore should not be respecified before using it for hypothesis testing.

The researchers also moved on to testing for multicollinearity using the condition index criteria. The test of multicollinearity is presented in Table 4.6 as follows: The F statistic and the observed R^2 test show that the series are not hetroskedastic but homoskedastic. This is of course expected since the series has already been shown to be stationary. We The table shows that the probability of the calculated F statistic (0.0977) is greater than 5 percent. That is $0.0977 > 0.05$ implying that the model is adequately specified and that that no variable is omitted. We therefore conclude that the model is adequate and plausible.

We also know from various Econometric literature that if two or more time series are cointegrated, then there must be Granger causality between them either on one way or in both directions. Thus, employing Granger causality test, we show the causal relationship between financial development indicators and the growth of the economy in table 4.9. Table 4.9: Granger Causality Test Table 4.9 shows that there is short run causality between capital market liquidity (VST/GDP) and the growth of the economy with a feedback effect. Economic volatility (CPS/GDP) also has a feedback effect with the growth of the economy. While Market Capitalization ratio (MKTCAP/GDP), Broad money velocity (M2/GDP) and the banking system rate of financing the economy (DD/M1) are one directionally driving economic growth. In other words, in the short run, financial development indicators drives economic growth.

V.

12 Conclusion

The intermediation efficiency of the financial sector as well as capital market liquidity do not instantly impact positively on economic growth rather it takes a little time lag for them to manifest positive and significant impact on the economy. The broad money velocity, economic volatility, and market capitalization ratio engender economic growth in the country while the banking sector financing of the economy is significantly inadequate and consequently poses a negative impact on the growth of the economy.

There is bidirectional causality between capital market liquidity or economic volatility and the growth of the Nigerian economy. While market capitalization ratio, broad money velocity and the banking system rate of financing the economy drive the growth of economy with no feed-back effect. For the Nigerian economy to achieve an increased economic growth, government should embark on well articulated reform packages capable of increasing the banking sector involvement in the financing of the economy.

13 Pairwise Granger Causality

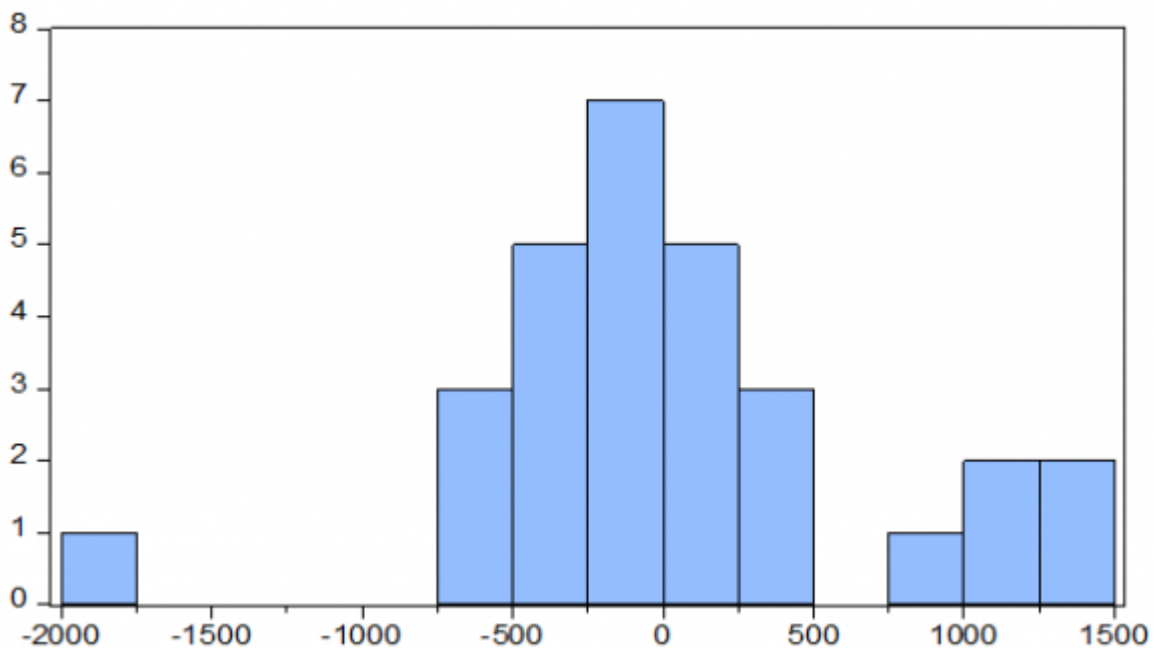


Figure 1:

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41

| Year | GDP | VSTGDP | Mcapgdp | M2GDP | CPSGDP | COBM2 | DDM1 |
|------|-----------|--------|---------|-------|--------|-------|------|
| 1981 | 94.33 | 323 | 5 | 15.3 | | 9.1 | 27 |
| 1982 | 101.01 | 213 | 5 | 15.6 | | 10.6 | 27 |
| 1983 | 110.06 | 362 | 5 | 16.1 | | 10.6 | 27 |
| 1984 | 116.27 | 221 | 5 | 17.3 | | 10.7 | 24 |
| 1985 | 134.59 | 235 | 5 | 16.6 | | 9.7 | 22 |
| 1986 | 134.6 | 370 | 4 | 17.7 | | 11.3 | 22 |
| 1987 | 193.13 | 198 | 3 | 14.3 | | 10.9 | 22 |
| 1988 | 263.29 | 323 | 3 | 14.6 | | 10.4 | 25 |
| 1989 | 382.26 | 160 | 3 | 12 | | 8 | 21 |
| 1990 | 472.65 | 48 | 3 | 11.2 | | 7.1 | 28 |
| 1991 | 545.67 | 44 | 3 | 13.8 | | 7.6 | 31 |
| 1992 | 875.34 | 56 | 3 | 12.7 | | 6.6 | 33 |
| 1993 | 1,089.68 | 74 | 3 | 15.2 | | 11.7 | 35 |
| 1994 | 1,399.70 | 70 | 2 | 16.5 | | 10.2 | 39 |
| 1995 | 2,907 | 63 | 4 | 9.9 | | 6.2 | 37 |
| 1996 | 4032.3 | 172 | 7 | 8.6 | | 5.9 | 34 |
| 1997 | 4189.25 | 25 | 7 | 9.9 | | 7.5 | 32 |
| 1998 | 3989.45 | 34 | 7 | 12.2 | | 8.8 | 32 |
| 1999 | 4679.21 | 301 | 5 | 13.4 | | 9.2 | 30 |
| 2000 | 6713.57 | 419 | 7 | 13.1 | | 7.9 | 31 |
| 2001 | 6895.2 | 837 | 8 | 18.4 | | 11.1 | 27 |
| 2002 | 7795.76 | 762 | 8 | 19.3 | | 11.9 | 26 |
| 2003 | 9913.52 | 1215 | 14 | 19.7 | | 11.1 | 21 |
| 2004 | 11411.07 | 1979 | 19 | 18.7 | | 12.5 | 22 |
| 2005 | 14610.88 | 1800 | 20 | 18.1 | | 12.6 | 21 |
| 2006 | 18,564.59 | 2,533 | 28 | 20.5 | | 12.3 | 17 |
| 2007 | 20657.32 | 5209 | 64 | 24.8 | | 17.8 | 14 |
| 2008 | 24296.33 | 6911 | 39 | 33 | | 28.6 | 11 |
| 2009 | 24794.24 | 2766 | 28 | 38 | | 36.9 | 10 |
| 2010 | 54612.26 | 3465 | 18 | 20.2 | | 18.6 | 10 |
| 2011 | 62980.4 | 1014 | 16 | 19.3 | | 16.9 | 10 |
| 2012 | 71713.94 | 1124 | 21 | 19.4 | | 20.4 | 10 |
| 2013 | 80092.56 | 2935 | 24 | 18.9 | | 19.7 | 10 |
| 2014 | 89043.62 | 1499 | 19 | 19.9 | | 19.2 | 8 |

The GDP and financial development indicators in the table above are tasted for stationarity to avoid spurious results which could have arisen if non stationary data are used for regression. The result

Source: Compiled from CBN Statistical Bulletin shows that all the variables are stationary at first difference. In other words all the variables are integ of order one, I(1). The summary of these results is shown in table 4.2 as follows:

Figure 2: Table 4 . 1 :

| | Lag | ADF Test Statistic | Critical Values | | |
|---------|-----|--------------------|-----------------|-----------|------------|
| | SCI | 1st difference | 1% | 5% | Remarks |
| GDP | 4 | -3.863830 | -3.653730 | -2.957110 | Stationary |
| VSTGDP | 8 | -6.552533 | -3.653730 | -2.957110 | Stationary |
| MCAPGDP | 8 | -5.879994 | -3.653730 | -2.957110 | Stationary |
| M2GDP | 8 | -5.378874 | -3.653730 | -2.957110 | Stationary |
| CPSGDP | 8 | -5.726112 | -3.661661 | -2.960411 | Stationary |
| COBM2 | 8 | -4.870376 | -3.653730 | -2.957110 | Stationary |
| DDM1 | 8 | -5.232303 | -3.653730 | -2.957110 | Stationary |

Figure 3: Table 4 . 2 :

Dependent Variable: D (GDP)

Method: Least Squares

Date: 03/04/17 Time: 17:16

Sample (adjusted): 1986 2014

Included observations: 29 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---------------------|-------------|-----------------------|-------------|----------|
| D(GDP(-3)) | 1.131716 | 0.092826 | 12.19176 | 0.0000 |
| D(GDP(-4)) | 0.128731 | 0.045405 | 2.835145 | 0.0132 |
| D(COBM2(-1)) | -285.0871 | 112.1978 | -2.540933 | 0.0235 |
| D(COBM2(-3)) | 311.5502 | 113.4656 | 2.745768 | 0.0158 |
| D(CPSGDP(-1)) | 316.4391 | 136.0973 | 2.325094 | 0.0356 |
| D(CPSGDP(-2)) | 654.3071 | 67.66742 | 9.669456 | 0.0000 |
| D(CPSGDP(-3)) | 783.8138 | 137.5658 | 5.697737 | 0.0001 |
| D(DDM1(-2)) | -194.4585 | 60.83273 | -3.196609 | 0.0065 |
| D(DDM1(-3)) | -410.7492 | 109.3208 | -3.757283 | 0.0021 |
| D(M2GDP(-1)) | 417.7338 | 189.1424 | 2.208568 | 0.0444 |
| D(MCAPGDP(-1)) | 109.6002 | 28.91204 | 3.790815 | 0.0020 |
| D(VSTGDP(-1)) | -3.163521 | 0.218548 | -14.47518 | 0.0000 |
| D(VSTGDP(-4)) | 2.407486 | 0.539429 | 4.463028 | 0.0005 |
| ECT(-1) | -0.071766 | 0.028613 | -2.508156 | 0.0251 |
| C | 320.4475 | 222.6680 | 1.439127 | 0.1721 |
| R-squared | 0.986988 | Mean dependent var | | 3065.829 |
| Adjusted R-squared | 0.973976 | S.D. dependent var | | 5894.833 |
| S. E. of regression | 950.9460 | Akaike info criterion | | 16.85904 |
| Sum squared resid | 12660176 | Schwarz criterion | | 17.56626 |
| Log likelihood | -229.4560 | Hannan-Quinn criter. | | 17.08053 |
| F-statistic | 75.85309 | Durbin-Watson stat | | 2.476241 |
| Prob(F-statistic) | 0.000000 | | | |

Figure 4: Table 4 . 4 :

45

Breusch-Godfrey Serial Correlation LM Test:

| | | | |
|---------------|----------|----------------------|--------|
| F-statistic | 1.074760 | Prob. F (1,13) | 0.3188 |
| Obs*R-squared | 2.214464 | Prob. Chi-Square (1) | 0.1367 |

Figure 5: Table 4 . 5 :

46

Figure 6: Table 4 . 6 :

4

| | | | | | | |
|-----------|----------------------------|---------------|------------------------|------------|--------------|--------------|
| Year | | | | | | |
| 6 | | | | | | |
| Volume | Variance Inflation Factors | | | | | |
| XVIII | | | | | | |
| Issue II | | | | | | |
| Version I | | | | | | |
| Global | Date: 03/04/17 | Time: 17:26 | Sample: | Uncentered | Centered | |
| Journal | 1981 2014 | Coefficient | Variable | Variance | VIF 9.709253 | VIF 8.410134 |
| of Man- | D(GDP(-3)) | 0.008617 | D(GDP(-4)) | | 2.163407 | 1.929747 |
| agement | 0.002062 | D(COBM2(-1)) | 12588.35 | | 2.951161 | 2.857077 |
| and | D(COBM2(-3)) | 12874.44 | D(CPSGDP(- | | 3.146364 | 3.004485 |
| Business | 1)) 18522.49 | D(CPSGDP(-2)) | 4578.880 | | 13.15236 | 13.09515 |
| Research | D(CPSGDP(-3)) | 18924.35 | D(DDM1(- | | 3.248920 | 3.232151 |
| () C | 2)) 3700.621 | D(DDM1(-3)) | 11951.03 | | 13.17132 | 13.14267 |
| | D(M2GDP(-1)) | 35774.85 | D(MCAPGDP(- | | 2.561753 | 2.516033 |
| | 1)) 835.9058 | D(VSTGDP(-1)) | 0.047763 | | 7.942701 | 7.701627 |
| | D(VSTGDP(-4)) | 0.290983 | ECT(-1) | | 21.96579 | 21.96230 |
| | 0.000819 C | 49581.02 | Included observations: | | 2.154706 | 2.143199 |
| | 29 | | | | 2.048665 | 2.035250 |
| | | | | | 9.506051 | 9.396512 |
| | | | | | 2.387260 | 2.386915 NA |
| | | | | | 1.590017 | |

Figure 7: Table 4 .

47

Figure 8: Table 4 . 7 :

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic 0.366528 Prob. F(14,14)

Obs * R-squared 7.778335 Prob. Chi-Square(14)

Scaled explained SS 2.868501 Prob. Chi-Square(14)

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 03/04/17 Time: 18:50

Sample: 1986 2014

Included observations :

29

| Variable | Coefficient | Std. Error | t-Statistic |
|----------|-------------|------------|-------------|
|----------|-------------|------------|-------------|

| | | | |
|--------------|----------|----------|----------|
| C D(GDP(-3)) | 568553.5 | 223891.9 | 2.539411 |
|--------------|----------|----------|----------|

| | | | |
|------------|----------|----------|-----------|
| D(GDP(-4)) | 72.87875 | 45.65501 | -0.780817 |
|------------|----------|----------|-----------|

| | | | |
|--|----------|--|-----------|
| | 33.52181 | | -0.734242 |
|--|----------|--|-----------|

| | | | |
|--------------|-----------|----------|-----------|
| D(COBM2(-1)) | -11069.69 | 112814.5 | -0.098123 |
|--------------|-----------|----------|-----------|

| | | | |
|--------------|----------|----------|----------|
| D(COBM2(-3)) | 37468.49 | 114089.3 | 0.328414 |
|--------------|----------|----------|----------|

| | | | |
|---------------|----------|----------|----------|
| D(CPSGDP(-1)) | 126687.9 | 136845.5 | 0.925774 |
|---------------|----------|----------|----------|

| | | | | | | | | | |
|---------------|-----------|----------|----------|----------|----------|----------|----------|----------|---|
| D(CPSGDP(-2)) | -7574.406 | 68039.38 | 138322.0 | 61167.12 | 109921.7 | 190182.1 | 29070.96 | 219.7492 | 5 |
|---------------|-----------|----------|----------|----------|----------|----------|----------|----------|---|

| | | | | | | | | | |
|---------------|-----------|--|--|--|--|--|--|--|--|
| D(CPSGDP(-3)) | -184679.0 | | | | | | | | |
|---------------|-----------|--|--|--|--|--|--|--|--|

| | | | | | | | | | |
|-------------|----------|--|--|--|--|--|--|--|--|
| D(DDM1(-2)) | 33204.94 | | | | | | | | |
|-------------|----------|--|--|--|--|--|--|--|--|

| | | | | | | | | | |
|-------------|----------|--|--|--|--|--|--|--|--|
| D(DDM1(-3)) | 48026.08 | | | | | | | | |
|-------------|----------|--|--|--|--|--|--|--|--|

| | | | | | | | | | |
|--------------|-----------|--|--|--|--|--|--|--|--|
| D(M2GDP(-1)) | -168869.5 | | | | | | | | |
|--------------|-----------|--|--|--|--|--|--|--|--|

| | | | | | | | | | |
|----------------|-----------|--|--|--|--|--|--|--|--|
| D(MCAPGDP(-1)) | -1271.794 | | | | | | | | |
|----------------|-----------|--|--|--|--|--|--|--|--|

| | | | | | | | | | |
|---------------|-----------|--|--|--|--|--|--|--|--|
| D(VSTGDP(-1)) | -115.3502 | | | | | | | | |
|---------------|-----------|--|--|--|--|--|--|--|--|

| | | | | | | | | | |
|---------------|---------|--|--|--|--|--|--|--|--|
| D(VSTGDP(-4)) | ECT(-1) | | | | | | | | |
|---------------|---------|--|--|--|--|--|--|--|--|

| | | | | | | | | | |
|-----------|----------|--|--|--|--|--|--|--|--|
| R-squared | Adjusted | | | | | | | | |
|-----------|----------|--|--|--|--|--|--|--|--|

| | | | | | | | | | |
|-----------|--------------------|--|--|--|--|--|--|--|--|
| R-squared | S.E. of regression | | | | | | | | |
|-----------|--------------------|--|--|--|--|--|--|--|--|

| | | | | | | | | | |
|--------------------------|--|--|--|--|--|--|--|--|--|
| Sum of squared residuals | | | | | | | | | |
|--------------------------|--|--|--|--|--|--|--|--|--|

| | | | | | | | | | |
|----------------|-------------|--|--|--|--|--|--|--|--|
| Log likelihood | F-statistic | | | | | | | | |
|----------------|-------------|--|--|--|--|--|--|--|--|

| | | | | | | | | | |
|-------------------|--|--|--|--|--|--|--|--|--|
| Prob(F-statistic) | | | | | | | | | |
|-------------------|--|--|--|--|--|--|--|--|--|

| | | | | | | | | | |
|--|----------|--|--|--|--|--|--|--|--|
| | 1.28E+13 | | | | | | | | |
|--|----------|--|--|--|--|--|--|--|--|

| | | | | | | | | | |
|--|-----------|--|--|--|--|--|--|--|--|
| | -429.9399 | | | | | | | | |
|--|-----------|--|--|--|--|--|--|--|--|

| | | | | | | | | | |
|--|----------|--|--|--|--|--|--|--|--|
| | 0.366528 | | | | | | | | |
|--|----------|--|--|--|--|--|--|--|--|

| | | | | | | | | | |
|--|----------|--|--|--|--|--|--|--|--|
| | 0.964737 | | | | | | | | |
|--|----------|--|--|--|--|--|--|--|--|

Series: Residuals Sample 1986 2014 Observations

Probability

Figure 9: Table 4 . 8 :

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