FINANCIAL DEEPENING AND ECONOMIC GROWTH IN NIGERIA (1981-2012): A MANAGERIAL ECONOMIC PERSPECTIVE

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Abstract

The objective of this study is to determine the impact of financial deepening on economic growth in Nigeria. The supply leading hypothesis was adopted as the theoretical framework of the study. Data for analysis was for the period 1981-2012 obtained from the Central Bank of Nigeria Statistical Bulletin. The explanatory variables were logged values of broad money supply/GDP and Credit to the private sector/GDP. The times series data were tested for stationarity using the ADF unit root tests of stationarity and were found to be stationary at first difference. The Engle-Granger Cointegration technique and Error correction model were used for the test of long run relationship. Findings reveal that money supply (MS) is positive and weakly significant in determining economic growth. However, credit to the private sector was negative and not significant in the short run. The speed of adjustment of the ECM is 25.51%. This implies that if there are short run fluctuations, GDP will converge to its long run equilibrium path at a speed of about 25.51% in each period .The conclusion is that financial deepening does not have the desired impact on economic growth in Nigeria. Hence, there is a need for increase and improvement in access to private credit to enhance economic growth and investment.

Keywords: Economic Growth, Economic Perspective, Financial Deepening

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1 Introduction

Notably, one of the oldest debates in economics has remained the relationship between financial development and economic growth. The financial system is said to be very important and plays a fundamental role in the growth and development of any country (Williamson, 1987). The financial market propels the economy by channelling funds from individual as well as institutional investors to the most productive sector of the economy.

The link between financial system through its intermediation activities and growth has been well highlighted in Schumpeter (1911), Goldsmith (1969), McKinnon (1973) and Shaw (1973). A nation's financial system is much more than just an intermediary that ensures the allocation of savings to investment. The efficiency of such a system is endogenously achieved if the financial structure of that economy promotes optimal use of the resources available for development (Onwumere et al., 2013). The financial system performs this function of intermediation by channelling funds from areas where they abound in excess to where they are scarce. Deepened financial intermediation engenders growth by mobilizing more investments, and lifting returns to financial resources, which raises productivity.

Ndebbio (2004) asserts that economic growth and development of a country is determined by the extent to which finance and financial services are made available to the people. Financial deepening is a product of financial intermediation. He defined financial deepening simply as "an increase in the supply of financial assets in the economy". Further, he affirms that the summation of all the index of financial assets equals the size of financial deepening. In the words of Ndebbio (2004), "widest range of such assets as broad money, liabilities of non-bank financial intermediaries, treasury bills, value of shares in the stock market, money market funds, etc., will have to be included in the measure of financial deepening". All these variables impact economic growth through their activities and uses.

The supply of financial assets has a direct relationship with economic growth (Meltzer 1969; and Stein 1970). The depth of a financial system is

shallow when the supply of financial assets is low. However, when the supply of financial assets is high, the financial system is said to exhibit high debt. The latter situation is what is obtainable in most developed economies of the world. Developed countries experience with increasing per capita incomes has been associated with rapid growth in financial assets (Ndebbio, 2004). Poor supply of financial assets results in financial related repression. Okoli (2014) asserts that financial repression breeds '*financial shallowness*' which is a common problem infecting the growth of development economics. In addition, Okoli (2014) states that shallow finance is a product of lack of growth or stagnant growth of productivity of any country. "Where the depth of financial assets of any country is narrow, it can be referred to as a shallow financial depth. This condition explains why countries in such situation experiences low or negative per capita income" (Okoli, 2014).

The link between financial sector stability and growth is explained by increased market depth, which potentially increases market efficiency (Nzotta & Okereke, 2009). How does this situation go with Nigeria? Financial depth has been increasing in recent times, but a lot remains to be achieved. This gives credence to the wide varieties of reforms that have taken place in the country since 1986, all in a bid to formalize and integrate many stakeholders and players, especially the informal sector. According to Olofin and Afandigeh (2008), "this sector is poorly developed, limited in reach and not integrated into the formal financial system. Its exact size and effect on the economy remain unknown and a matter of speculation". The trend of financial assets to economic growth could be explained by the movement of two variables: broad money supply and credit to the private sector in the figure below.
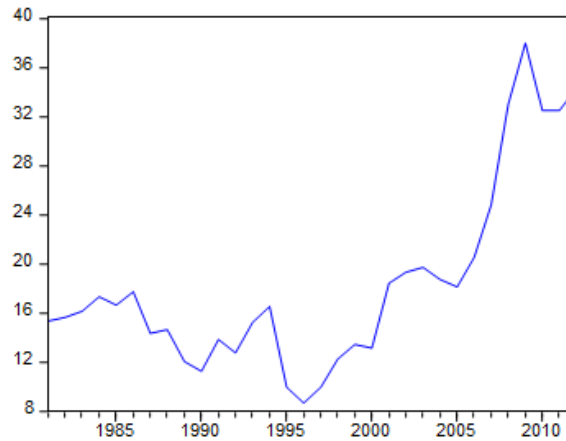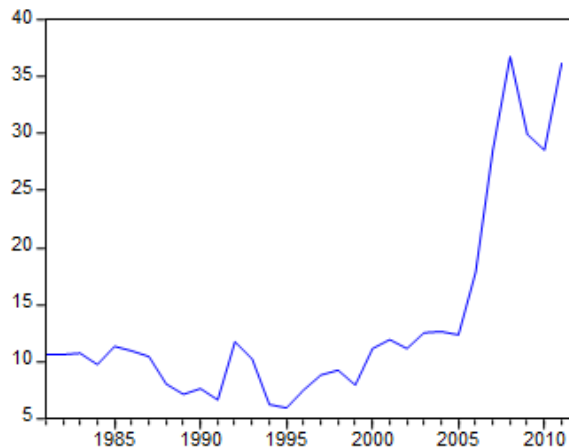
Figure 1. Ratio of M2/GDP

Figure 2. CPS/GDP

The reforms in the financial sector could be said to be yielding result as could be seen from the graph since 2004. The depth of money to economic growth spiked from 18.7% in 2004 to 38% in 2009. It declined to 32.5% in 2010 and 2011. It climbed to 34.3% by 2012. With respect to credit to the private sector and GDP, there was a hike in the ratio from 12.5% in 2004 to 36.7% in 2009. The ratio declined to 29.9% and 28.5% in 2010 and 2011 respectively. The trend reversed to an increase of 36.1% as at 2012

(CBN, 2012). Truly, there have been noted developments in the Nigerian financial market in recent times. However, in spite of these, a lot still remains to be achieved. Quoting (Oriavwote & Eshanake, 2014), "the problem of macroeconomic instability has continued to be a hindrance to the development of the financial sector in Nigeria. Frequent policy reversals have caused disinvestment in the financial and real sectors, which have negatively affected macroeconomic performance". The implication from the above is that the need for increased financial accessibility and inclusion is imperative, hence the need for this study. Therefore, the objective of this study is to evaluate the impact of financial deepening and growth and to determine a long run relationship between financial deepening variables and economic growth in Nigeria.

This study is divided into five sections. The first section is the introduction. Section two is the literature review including the framework of study. Section three presents a general specification of the model. Section four presents the results of the analysis and their implications, while the last section is the concluding statement and recommendations.

2 Literature review

2.1 Theoretical framework

Financial sector as the backbone of economic growth has been supported by a lot of theoretical and empirical evidences (Mackinnon 1973; Shaw 1973; Ross Levine, 2001). The Solow (1957) neoclassical growth model identified economic growth to be contingent on capital accumulation, which involves increasing the stock of capital goods for the purpose of expanding productivity, creating adequate savings and increasing allocation of resources towards investment. Specifically, Schumpeter (1911) affirms that financial intermediation is the nucleus of economic growth. He insists 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". Countries with well-developed institutions according to empirical studies tend to progress faster. In such countries, stock market liquidity and the size of the money deposits in banks play crucial roles in economic development by affecting the allocation of savings (Bencivenga and Smith, 1991; Ross Levine 2001).

The financial sector lowers transaction costs, affects savings and raises the return of investment. Therefore, the financial sector will enhance economic growth. The financial system of any economy plays a determining role by ensuring that savings are invested in an efficient and optimal way. Onwumere et al., (2013) in their study on the impact of financial structure on economic growth formulated an endogenous growth model which assumes away population growth and technological change. They stated that growth is driven capital accumulation. This is based on the belief that financial development enhances economic growth. The significance of these studies is that the link between financial sector and economic growth could be traced through the activities of the banks and non-bank institutions in the financial system. The endogenuous growth theory is supportive of the supply leading hypothesis.

The stance of the supply-leading hypothesis holds that the availability of robust financial market leads to increasing supply of financial assets to meet up with their demand by the sector for goods and services. This hypothesis contends that well-developed financial institutions have the capacity of promoting general economic efficiency, creating and increasing liquidity, enhancing savings mobilization and accumulation of capital, transferring productive factors from rural to modern use, where it will contribute better to manufacture and industry (Mckinnon, 1973; Shaw 1973). Darrat (1999) in the same vein asserts that what is needed is for government to aim at promoting policies that fosters financial accessibility/deepening for sustainable economic development.

2.2 Empirical studies

Many empirical studies have been undertaken by researchers to investigate the impact of financial deepening on economic growth over the years in Nigeria.

The study of Ndebbio (2004) was on the impact of financial deepening on economic growth in developing economies of sub-Sahara countries. He identified the range of financial products/variables that could be used to estimate financial deepening in 34 sub-Saharan countries. The study used broad money supply/GDP and the growth rate in per capita income in its estimation of financial deepening. Three modelled equations were estimated with multiple OLS regression procedure. One of the findings is that financial deepening variables are neither statistically significant nor positive in explaining economic growth in the cross-country regression analysis.

Nzotta and Okereke (2009) estimated the determinants of financial deepening in Nigeria. Time series variables for the period 1986 to 2007 were used. The study employed a two-stage least square regression technique analysis and a trend analytical technique in its investigation. Findings reveals that interest rate, financial savings ratio, ratio of cheques to GDP, and ratio of deposit money banks to GDP are statistically significant in determining financial deepening. The study concludes that the level of financial deepening in Nigeria is low and ineffective.

In a related study, Nguena & Abimbola (2013) examines "Financial Deepening Dynamics and Implication for Financial Policy Coordination in a

Monetary Union: the case of WAEMU". The study adopted a hypothetical-deductive theoretical approach and an empirical investigation in both static and dynamic panel data econometrics that permitted the identification of some stylized facts on this issue and have led to the following global recommendations based on the empirical investigation. The converging dynamics is evident in the sub-region and implies that after five years, financial policies harmonization would have an optimal impact. This highlights the feasibility of common effective monetary policy targeting indirectly on financial depth in the sub-region.

Onwumere, Onodugo & Ibe, (2012) studies "the impact of Financial Deepening on Economic Growth in Nigeria". The study adopted as a theoretical framework, the supply leading hypothesis. The proxies used for financial deepening include: broad money velocity, money stock diversification, economic volatility, market capitalization and market liquidity, while the proxy for the dependent variable was rate of Gross domestic product. The study reveals that while broad money velocity and market liquidity enhance economic growth, market capitalization, economic volatility and stock diversification were not statistically significant in determining economic growth during the period under study (1992-2008). The study therefore recommends a public policy that would strategically lead to increase in money supply, thus creating and expanding liquidity, mobilizing savings and boosting overall economic efficiency.

The study by Aye (2013) investigated the dynamic causal relationship between financial deepening, economic growth and poverty in Nigeria using annual time series covering 1960 to 2011 periods. The Johansen cointegration test is used to examine the long-run relationship between finance, growth and poverty. The short and long run causality between these variables is tested using a modified Hsaio-Granger causality within a Vector Autoregressive (VAR) and Vector Error Correction Model (VECM) framework. The results indicate no evidence of long run equilibrium relationship between financial deepening, economic growth and poverty. The study results show a short-run unidirectional causality from growth to poverty conditional on finance. This supports the indirect channel through which finance affects poverty via growth. We also found evidence of causality from poverty to financial deepening conditional on growth.

Okoli (2014) estimates the relationship between financial deepening and returns from the Nigeria stock market using the technique of GARCH (1, 1). In the study, financial deepening is proxied by the ratio of value stock traded to GDP and the ratio of market capitalization to GDP. Findings reveals that ratio of value of stock traded has no significant impact on stock market. On the other hand, the ratio of market capitalization to GDP is statistically significant in determining events in the stock market. The study concludes that better performance of the stock market will improve risk reduction, investor's confidence and invariably boost growth of the stock market.

In summary, financial deepening has been identified as one of those strategies whose implementation can quicken the pace of development. However, the effect of this strategy needs to be determined and examined from time to time especially for developing economies.

Secondly, the review above shows that the relationship and impact of financial deepening on economic growth is still far from controversy since there is no uniformity among the studies. There is dearth of literature on the impact of financial deepening on economic growth in developed economies. This study will add to the few existing literature in this area of study.

Herein, lays the essence of this study, employing the method of vector error correction model to analyse a long run relationship between financial deepening variables and economic growth.

3 Methodology

This study follows the methods of econometric analysis. The procedure starts with the testing of the time series data for stationarity using the Augmented Dickey Fuller Unit root test. After this, the Engle-granger two-step procedure for cointegration is applied in determining the parameters estimates. The first step involves the running of the estimation of the basic ordinary least square estimates to obtain the residual of the regression equation. The second step involves testing the residual for stationarity. If the residual is found to be stationary at level, then cointegration exists (Engle and Granger, 1987).

The final step was the estimation of the error correction model to reconcile the short run to the long run equilibrium. We examine the error correction term (coefficient) to determine the speed of adjustment of the GDP whenever there is a shock to the economy.

3.1 Model specification

This study adopted the supply leading hypothesis which states that "the presence of efficient financial markets increases the supply of financial services in advance of the demand for them in the real sector of the economy" (Onwumere et al. 2012). This model was adopted as growth equation model by Levine (2000) which was also modified by Onwumere et al. (2012). It is stated thus:

$$EG = f\ (BMV,\ MSD,\ EV,\ MC,\ ML) = 0 \qquad (1)$$

Where:
Gross Domestic Product = GDP
Broad Money Velocity = BMV
Money Stock Diversification = MSD
Economic Volatility = EV
Market Capitalization = MC
Market Liquidity = ML

However, to suit the objective of this study, the model is modified to reflect two main variables of financial deepening used for this study (M2/GDP and CPS/GDP).

Again, in order to permit long run analysis of time series variables, while avoiding the problems of multi-collinearity and hetereoscedasticity, the present researchers limited financial deepening to two variables: the ratio of broad money supply to gross domestic product (M2/GDP) and the ratio of credit to the private sector to gross domestic product (CPS/GDP).

The model is specified in log form as follows:

$$Log\ (GDP) = \beta_0 + \beta_1 MS + \beta_2 CPS + \mu \qquad (2)$$

Where:
Log (GDP) = log of Gross domestic product (proxy for economic growth)

MS = Broad money supply (M2/GDP): "Financial deepening is thus measured by relating monetary and financial aggregates such as M1, M2 and M3 to the Gross Domestic Product (GDP). The logic here is that the more liquid money is available to an economy, the more opportunities exist for continued growth of the economy" (Karahan et al. 2011). The choice of financial intermediation degree measurement approximated by M2/GDP and the level of per capita nominal or real cash growth rate has also been made by several authors like Arestis, Chortareas and Desli (2006); Levine (2004); among others and earlier by Fry (1978). Recently Karahan & Metehan (2011) for purposes of analyzing the impact of financial deepening in economic growth have used only simple indicator which is the ratio of money supply to GDP.

CPS = Credit to Private Sector (CPS/GDP): The financial indicator measures the amount of credit involved in the private sector relative to the size of the economy; specifically the variable domestic credit to the private sector measures all private resources used to finance the private sector divided by GDP. This measure has been used by Dehesa (2007); and Ndebbio (2004).

μ = stochastic term
$\beta_0, \beta_1, \beta_2$ = regression coefficient

4 Results and analysis

The result of the unit root test of stationarity is presented in Table 1.1 below: The result shows that all the variables were integrated at first difference, I(1). None of the variables were integrated at levels. Therefore, we go to test for cointegration. The result is presented in Table 1.2.

Table 1. Result of Augmented Dickey-Fuller Unit Root Test

Variables	t-statistic (with intercept)	5% critical values	Order of integration
Log(GDP)	-4.470596	-2.963972	I(1)
Log(MS)	-3.288131	-2.963972	(1)
Log(CPS)	-4.147798	-2.963972	(1)

The OLS residual (ECM) was tested for unit root at levels, no trend, no intercept and was found to be stationary at levels. The implication is that there is presence of cointegration. The test for the long run and stability of the model, we carried out the error correction model analysis. The result is presented in table 1.3

Table 2. Engle-Granger Cointegration

Variables	t-statistic (No trend, no intercept)	5% critical values	Order of integration
ECM	-5.062863	-1.952910	I(0)

The result of the parsimonious error correction model displayed in Table 1.3 indicates that the error correction model is well behaved since it is signed negatively. The ECM term is not significant with the probability of its coefficient above 0.05 level of significance. The speed of adjustment of the ECM is 25.51%. This implies that if there are short run fluctuations, GDP will converge to its long run equilibrium path at a speed of about 25.51% in each period.

Table 3. Parsimonous Error Correction Model

Variables	Coefficient	t-statistic	Probability
Dependent Variable	Log(GDP)		
C	0.085456	1.108554	0.2782
Log(MS)	0.685925	1.879044	0.0719
Log(CPS)	-0.164370	-0.711966	0.4831
ECM(-1)	-0.255173	-1.237527	0.2274
F	1.36		
R^2	0.140		
Durbin-Watson	1.63		

An examination of the explanatory variables showed that money supply (MS) is statistically significant in determining economic growth, Log (GDP) at 10% level of significance. However, credit to the private sector was not significant in the short run. The Durbin Watson value of 1.63, means that there is no serious problem of serial correlation in the model. The F-ratio value is not significant at the 5 percent level, since its value is 1.36. The overall fit of the regression model measured by the F- statistic, is not statistically significant at this level. All these imply that the explanatory variables are not jointly statistically significant in explaining the dependent variable. This present finding agrees with Nzotta and Okereke (2009) who claimed that financial deepening is low in Nigeria. It also harmonises with the study of Ndebbio (2004) on financial deepening, economic growth and development in selected sub-Saharan African countries, which reveals that financial development does not have a significant impact on per capita growth of output. This could be ascribed to shallow finance and non-existence of well-functioning capital market. The present study also concurs with the study of Nnanna (2004) which affirms that financial sector development do not have a positive impact on per capita growth of output.

5 Conclusions

The implication of the findings is that although the financial structure had enhanced the level of financial savings and thus affected the level of financial deepening, the financial system has not been efficient in resource allocation evidently in Nigeria. The process of intermediation in the Nigeria's financial system is poor and inefficient. Although the financial system has been growing tremendously in size and structure this has not been translated in the provision of loans and credits especially to the real sector of the economy. Therefore, there is need for pragmatic and more inclusive monetary policies that would improve availability, accessibility and usage of financial assets in order to boost economic growth and development in Nigeria.

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Appendix

Table A.1. Result of ordinary least squares

Dependent Variable: LOG(GDP)
Method: Least Squares
Date: 09/23/14   Time: 21:38
Sample: 1981 2012
Included observations: 32

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.433158	0.419792	5.796109	0.0000
LOG(MS)	1.733923	0.367193	4.722109	0.0001
LOG(CPS)	-0.809239	0.352657	-2.294690	0.0292

R-squared	0.983370	Mean dependent var	14.60584
Adjusted R-squared	0.982223	S.D. dependent var	2.061106
S.E. of regression	0.274807	Akaike info criterion	0.343567
Sum squared resid	2.190053	Schwarz criterion	0.480980
Log likelihood	-2.497071	Hannan-Quinn criter.	0.389115
F-statistic	857.4180	Durbin-Watson stat	0.462479
Prob(F-statistic)	0.000000		

Table A.2. Stationarity test

Null Hypothesis: LOG(GDP) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=1)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.630339	0.8495
Test critical values:	1% level	-3.661661	
	5% level	-2.960411	
	10% level	-2.619160	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOG(GDP))
Method: Least Squares
Date: 09/23/14   Time: 21:38
Sample (adjusted): 1982 2012
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(GDP(-1))	-0.009269	0.014705	-0.630339	0.5334
C	0.330111	0.215405	1.532515	0.1362

R-squared	0.013516	Mean dependent var	0.195594
Adjusted R-squared	-0.020501	S.D. dependent var	0.161405
S.E. of regression	0.163052	Akaike info criterion	-0.727160
Sum squared resid	0.770988	Schwarz criterion	-0.634644
Log likelihood	13.27098	Hannan-Quinn criter.	-0.697002
F-statistic	0.397328	Durbin-Watson stat	1.636378
Prob(F-statistic)	0.533409		

Table A.2. Stationarity test (continued)

Null Hypothesis: LOG(MS) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic based on SIC, MAXLAG=1)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.138589	0.9361
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOG(MS))
Method: Least Squares
Date: 09/23/14   Time: 21:42
Sample (adjusted): 1983 2012
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(MS(-1))	-0.001217	0.008778	-0.138589	0.8908
D(LOG(MS(-1)))	0.464189	0.173475	2.675829	0.0125
C	0.137396	0.110848	1.239492	0.2258
R-squared	0.216793	Mean dependent var		0.226005
Adjusted R-squared	0.158778	S.D. dependent var		0.108863
S.E. of regression	0.099847	Akaike info criterion		-1.675715
Sum squared resid	0.269175	Schwarz criterion		-1.535595
Log likelihood	28.13573	Hannan-Quinn criter.		-1.630890
F-statistic	3.736827	Durbin-Watson stat		2.004287
Prob(F-statistic)	0.036926			

Null Hypothesis: D(LOG(MS)) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=1)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.288131	0.0245
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.

Table A.2. Stationarity test (continued)

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOG(MS),2)
Method: Least Squares
Date: 09/23/14   Time: 21:42
Sample (adjusted): 1983 2012
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOG(MS(-1)))	-0.541923	0.164812	-3.288131	0.0027
C	0.123170	0.041105	2.996486	0.0057

R-squared	0.278570	Mean dependent var		0.001512
Adjusted R-squared	0.252805	S.D. dependent var		0.113469
S.E. of regression	0.098083	Akaike info criterion		-1.741671
Sum squared resid	0.269366	Schwarz criterion		-1.648257
Log likelihood	28.12506	Hannan-Quinn criter.		-1.711787
F-statistic	10.81181	Durbin-Watson stat		1.993247
Prob(F-statistic)	0.002722			

Null Hypothesis: LOG(CPS) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=1)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		1.025667	0.9958
Test critical values:	1% level	-3.661661	
	5% level	-2.960411	
	10% level	-2.619160	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOG(CPS))
Method: Least Squares
Date: 09/23/14   Time: 21:43
Sample (adjusted): 1982 2012
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(CPS(-1))	0.013126	0.012798	1.025667	0.3135
C	0.078339	0.160374	0.488475	0.6289

R-squared	0.035006	Mean dependent var		0.240125
Adjusted R-squared	0.001730	S.D. dependent var		0.161370
S.E. of regression	0.161230	Akaike info criterion		-0.749626
Sum squared resid	0.753861	Schwarz criterion		-0.657110
Log likelihood	13.61920	Hannan-Quinn criter.		-0.719468
F-statistic	1.051993	Durbin-Watson stat		1.601099
Prob(F-statistic)	0.313528			

Table A.2. Stationarity test (continued)

Null Hypothesis: D(LOG(CPS)) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=1)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.147798	0.0031
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOG(CPS),2)
Method: Least Squares
Date: 09/23/14   Time: 21:44
Sample (adjusted): 1983 2012
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOG(CPS(-1)))	-0.764894	0.184410	-4.147798	0.0003
C	0.184983	0.052889	3.497607	0.0016

R-squared	0.380589	Mean dependent var	0.003296
Adjusted R-squared	0.358467	S.D. dependent var	0.202681
S.E. of regression	0.162339	Akaike info criterion	-0.733919
Sum squared resid	0.737911	Schwarz criterion	-0.640506
Log likelihood	13.00879	Hannan-Quinn criter.	-0.704036
F-statistic	17.20422	Durbin-Watson stat	1.854950
Prob(F-statistic)	0.000282		

Table A.3. Engle-Granger cointegration: unit root test of the residual

Null Hypothesis: ECM has a unit root
Exogenous: None
Lag Length: 0 (Automatic based on SIC, MAXLAG=1)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.062863	0.0000
Test critical values:	1% level	-2.647120	
	5% level	-1.952910	
	10% level	-1.610011	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(ECM)
Method: Least Squares
Date: 09/23/14   Time: 21:45
Sample (adjusted): 1984 2012
Included observations: 29 after adjustments

Table A.3. Engle-Granger cointegration: unit root test of the residual (continued)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ECM(-1)	-0.951128	0.187864	-5.062863	0.0000

R-squared	0.476980	Mean dependent var	0.009256
Adjusted R-squared	0.476980	S.D. dependent var	0.220899
S.E. of regression	0.159755	Akaike info criterion	-0.796480
Sum squared resid	0.714604	Schwarz criterion	-0.749332
Log likelihood	12.54896	Hannan-Quinn criter.	-0.781714
Durbin-Watson stat	1.988011		

Table A.4. Parsimonous error correction model

Dependent Variable: D(LOG(GDP))
Method: Least Squares
Date: 09/23/14   Time: 21:49
Sample (adjusted): 1984 2012
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.085456	0.077088	1.108554	0.2782
D(LOG(MS))	0.685925	0.365040	1.879044	0.0719
D(LOG(CPS))	-0.164370	0.230868	-0.711966	0.4831
ECM(-1)	-0.255173	0.206196	-1.237527	0.2274

R-squared	0.140308	Mean dependent var	0.203761
Adjusted R-squared	0.037145	S.D. dependent var	0.163817
S.E. of regression	0.160746	Akaike info criterion	-0.690538
Sum squared resid	0.645984	Schwarz criterion	-0.501945
Log likelihood	14.01280	Hannan-Quinn criter.	-0.631473
F-statistic	1.360057	Durbin-Watson stat	1.620114
Prob(F-statistic)	0.277790		