

# Growth-Effects of Macroeconomic Stability Factors: Empirical Evidence from Nigeria

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## Abstract

This study empirically examines the growth-effects of macroeconomic stability factors in Nigeria. Using time series data for the period 1980 to 2011 and adopting various econometric techniques such as Augmented Dickey Fuller (ADF) test, Granger causality test, and Error Correction Mechanism (ECM), the results reveal that real interest rate significantly affects growth positively, while external debt and real exchange rate impact negatively on growth in the country. The study, however, concludes that for macroeconomic stability to be achieved in Nigeria, each of the factors should be examined individually such that its respective effect on growth could be identified while appropriate policy would be formulated and implemented where required.

**JEL Classification:** B22; E4

**Keywords:** Macroeconomic stability, Growth, Error correction mechanism, Inflation, External debt, Causality

## 1. Introduction

The desire of every economy is to experience and maintain sustainable growth. Ordinarily, the key macroeconomic goals pursued by world economies, aside from the increase in output, include the achievement of a balance in the national account, stability of general price level, and a rise in employment. The attainment of these macroeconomic objectives notwithstanding, the overall economy is required to be stable. Sustainable economic growth requires free and competitive function of prices and setting up a safe economic environment for promoting private sector investment. In this regard, macroeconomic stability can have very effective role (Dhonte & Kapur 1997). Macroeconomic stability is fundamental basis of sustainable economic growth, because, it increases national saving and private investment and also improves exports and balance of payments with improving competitiveness. A macroeconomic stability, therefore, to a large extent guarantees economic wellbeing of the people. To this end, there are several factors identified as potential determinant of macroeconomic stability such as low inflation, low deficit, stability of real exchange rate and exchange relationship. These aforesaid factors are serious drivers of economic growth.

In the light of the foregoing, the Nigerian economy has been set on the path of stability following various macroeconomic policies that were formulated and implemented at different periods. Prominent in these policies are the fiscal and monetary policies of the government. The remarkable growth which resulted is evident in an average annual real growth rate of GDP of over 6 per cent between 2004 and 2012. Specifically, the economy grew robustly at 7.45 per cent in 2011. This economic growth, however, has not translated into job creation or poverty alleviation as unemployment increased from 21 per cent in 2010 to 24 per cent in 2011. Against this backdrop, this study finds motivation for examining the effects of macroeconomic stability factors on economic growth in Nigeria.

Thus, following the trend of economic growth of the country, several studies have examined the likely variables that are responsible for such growth pattern. Many of the studies have concentrated on a pairwise relationship (see for example, Ajayi & Oke, 2012; Doguwa, 2012) and tripartite relationship (see for example, Odusola & Akinlo, 2001) among certain variables and growth in Nigeria. Yet, to the best of our knowledge, as there are no prescribed variables for macroeconomic stability for Africa or ECOWAS countries, this study therefore exploits the Maastricht criteria<sup>1</sup>. As such, as it contributes to the raging discussion, the study essentially explores the effects of inflation, real exchange rate, real interest rate and external debt on growth in Nigeria.

The rest of the study proceeds thus: section two presents the stylized facts on the Nigerian economy as a brief theoretical and empirical literature is reviewed in the third section. Methodology occupies the fourth section

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<sup>1</sup> The Treaty on European Union is a comprehensive document addressing all aspects of the political and economic union of the European Economic Community. The macroeconomic criteria required of all member nations have come to be known as the Maastricht Criteria, after the Dutch city that hosted the convention.

while empirical results are discussed in section five. Section six finalises the study with concluding remarks and recommendations.

## 2. Overview on the Nigerian Economy

In recent years, the performance of the Nigerian economy has responded positively to efficiency gains from economic reforms and has generated strong growth. Essentially, the economic growth at 7.0 per cent in 2009 underscored the resilience of the economy and in fact reflected the prudence of economic policies. The oil sector which drives the economy experienced declining output in the few periods before 2010. The decline was due largely to militant activities and the accompanying disruption of oil-producing activities. As prior to militants' attacks and destruction of oil facilities in 2005, Nigeria had been producing about 2.5 million barrels per day (bpd). The fall in oil production by about 40 per cent to 1.5 million barrels per day in 2008, however, appeared to stop in 2009. This necessarily resulted from the federal government's amnesty programme which brought relative peace to the Niger Delta area. As at the end of 2009, and extending to 2010, petroleum production had increased to more than 2 million bpd. Oil GDP which comprises of crude petroleum and natural gas grew by 3.9 per cent in 2010, thereby making petroleum production the dominant activity for export and government revenues in the same period. According to government records, oil and gas accounted for about 96 per cent of total export receipts and close to 66 per cent of total government revenues in 2010. The strong growth in output recorded in 2010 was majorly supported by the expansion in oil production following the relative peace in the Niger Delta region. Relatively, however, the growth in the non-oil sector averaged 8.3 per cent in 2010 and accounted for 84.8 per cent of total GDP. Essentially, growth in the non-oil sector was mainly driven by the telecommunications, general commerce, manufacturing, agriculture, and services sectors. The economy, however, slowed down in 2011 from growth rate of 7.4 per cent to 6.6 per cent in 2012.

More so, in the macroeconomic environment, the fiscal consolidation stance of the government helped to contain the fiscal deficit below 3.0 per cent of gross domestic product (GDP). This, coupled with the tight monetary policy stance of the Central Bank of Nigeria (CBN), helped to keep inflation at around 12.0 per cent in 2012. Earlier in 2009, the government, through its macroeconomic policy, eased the credit crunch by lowering interest rates in addition to recapitalising struggling banks. These policies, in essence, maintained the confidence of lenders and borrowers in the financial market and stimulated the economy. Nigeria's agricultural sector also performed remarkably well, with an actual growth rate exceeding 6.0 per cent in 2010, reflecting the good weather conditions that boosted crop production. The government's effort at addressing the protracted issues of inadequate credit and high interest rates in agricultural lending through the Commercial Agricultural Credit Scheme (CACS) also benefited agricultural expansion as in 2009/10 the government made 200 billion Naira available at low interest rates to farmers and other practitioners in the agricultural sector.

As a major exporter of oil, the country's external position is heavily influenced by developments in the international oil market. Although being the world's eighth largest exporter of crude oil yet Nigeria imports almost 90 per cent of domestically consumed petroleum products. Total exports, however, rose in 2010 as a result of higher oil prices and increased output. In the same period, a fall in infrastructure outlays brought about a decline in imports, leading to a sharp rise in the trade account. This improvement in the trade account was unavoidably offset by higher factor income and lower current transfers. According to the CBN, increased divestment, on the one hand, and repatriation of dividends, portfolio engagements and foreign-investment capital on the other, have exacerbated pressure on the current account. In addition, inward remittances plummeted as a consequence of the lingering effects of the global financial crisis. Accordingly, the current-account surplus was largely unchanged at 13.3 per cent of GDP from 13.1 per cent of GDP in 2009.

Meanwhile, past debt relief and buybacks facilitated by oil windfalls are estimated to have substantially reduced Nigeria's external debt to about 6 per cent of GDP at end-2010. This, along with a significant build-up in foreign-exchange reserves, has contributed to keeping Nigeria's external position quite healthy. The total external debt stock at end-2010 was USD 4.534 billion, out of which USD 4.152 billion was from concessional sources. The government has also approved a set of external borrowing guidelines for Nigeria, the main objective of which is to borrow only for projects that will yield positive economic or social returns.

## 3. Theoretical and Empirical Literature

### 3.1 *Theoretical Underpinning*

As a reform package, according to Krueger (1997), macroeconomic stability is a core requirement of the International Monetary Fund (IMF) and on which emphasis is placed. The term describes a national economy that has minimized vulnerability to external shocks, which in turn increases its prospects for sustained growth. Macroeconomic stability acts as a buffer against currency and interest fluctuations in the global market. It is,

however, a necessary, but insufficient requirement for growth. Such that an exposure to currency fluctuations, large debt burdens, and unmanaged inflation can cause economic crises and collapse in GDP (see World Economic Forum, 2006).

According to the Maastricht criteria, stability is measured by five variables: inflation, interest rate, debt, deficit, and currency stability. Essentially, low and stable inflation indicates healthy demand in the marketplace (Wessels, 1993). A high or unstable inflation threaten growth. Also, low long-term interest rates reflect stable future inflation expectations. While current inflation rates may be acceptably low, high long-term rates imply higher inflation to come. If these rates are kept low it implies that the economy is stable and is likely to remain so. Low national debt relative to GDP is indicative that the government will have the flexibility to use its tax revenue to address domestic needs instead of paying foreign creditors. In addition, a low national debt permits lenient fiscal policy in times of crisis. Keeping low deficits will curb growth in the national debt. Currency stability allows importers and exporters to develop long-term growth strategies and in reduces investors' needs to manage exchange-rate risk. For national accounting, currency stability reduces the threat posed by debt issue in foreign coin. The Maastricht criteria, however, capped inflation at 3 per cent, interest rate at 9 per cent, debt at 60 per cent of GDP, deficit at 3 per cent of GDP, and permitted fluctuation of 2.5 per cent at most.

### *3.2 Brief Review of Empirical Literature:*

#### *3.2.1. Growth vs Inflation*

Studies on the relationship that subsists between inflation and economic growth are vast in the empirical literature. Despite the varieties in the studies yet there is no convergence on the empirical findings as Samuelson & Nordhaus (1995) stressed that while economists may disagree on the exact target for inflation, most agree that a predictable and stable or gently rising price level provides the best climate for healthy economic growth. However, Fischer (1993) and De Gregorio (1993) found evidence for a negative link between inflation and growth. This was also confirmed by Barro (1995, 1996) and Andres & Hernando (1997) who found a significant negative effect of inflation on economic growth. Gokal & Hanif (2004) also examine the relationship between inflation and economic growth in Fiji for the period 1970-2003. The tests revealed that a weak negative correlation exists between inflation and growth, while the causality between the two variables ran one-way from GDP growth to inflation. Nevertheless, studies by Levine & Zervos (1993) and Sala-i-Martin (1997) suggested that inflation was not a robust determinant of economic growth.

Furthermore, as Sarel (1996) provides a threshold point estimate of 9.9 per cent, Khan & Senhadji (2001) identifies a 10.5 per cent inflation threshold as statistically significant to explain the inflation-growth nexus in Nigeria. Yet, Drukker, Gomis-Porqueras & Hernandez-Verme (2005) suggest a two threshold point model with 11.2 and 12.0 per cent as the appropriate inflation threshold points for Nigeria. Doguwa (2012), however, re-examines the issue of the existence and the level of inflation threshold in the relationship between inflation and growth, using three different approaches that provide appropriate procedures for estimating the threshold level and inference. The results suggest that the threshold level of inflation above which inflation is inimical to growth is estimated at 10.5 to 12 per cent for Nigeria.

#### *3.2.2. Growth vs Real Interest Rate*

The studies on growth and real interest rate nexus are few but precise in their findings. Such studies include D'Adda & Scorcu (1997) which examine the relationship between growth and real interest rate considering 20 industrialised countries for the period 1965-1994. The study reports a significant negative correlation between growth and real interest rate. Also, Anaripour (2011) employs a panel data of 22 countries for the period 2004-2010 to test the relationship between interest rate and economic growth. The results show that there is negative relationship between interest rate and economic growth and this relationship is a unilateral causal relationship between economic growth and interest rate. The study concludes that a fluctuation (increase or decrease) in interest rate has no effect on economic growth.

#### *3.2.3. Growth vs Real Exchange Rate*

Economists have long known that poorly managed exchange rates can be disastrous for economic growth. In this light, Kamin & Klau (1998) used an error correction technique to examine the relationship between real output and real exchange rate for a group of 27 countries. The study finds that devaluations were not contractionary in the long term. The result also shows that reverse causality appeared to alternate the measured contractionary effects of devaluation in the short term, although the effect persisted even after the introduction of controls. Hsing (2005) employs the IS-LM model to find a possible relationship between real GDP and selected macroeconomic variables which include the real exchange rate for Venezuela. Using annual time series data

from 1959–2001, the study reveals that depreciation of the real exchange rate raises real GDP growth in the country.

Meanwhile in an earlier study, Ito, Isard & Symansky (1999) investigate the correlation between real exchange rate and economic growth in Asian countries using the Balassa-Samuelson hypothesis. Findings from the study show that nontradable prices relative to tradable prices may not increase as the economy grows. Such that, tradable prices, measured in U.S. dollars, may deviate from tradable prices in the United States; and that economic reforms may cause negative correlation between growth and real appreciation. In addition, Thapa (2002) examined the econometric relationship between the real exchange rate and economic activities (measured by GDP) in Nepal using annual data from 1978–2000. The estimated ECM regression equation shows that real exchange rate has a contractionary effect on economic activities.

Employing a reduced-form equation, Edwards (1985) examines the contractionary effects of devaluation for 12 developing countries using annual data for the period 1965–1980. His empirical findings show that the initial contractionary effects of real devaluation are reversed after one year and that devaluation is neutral in the long run. Ghura & Grennes (1993), based on pooled time series and cross-section data for 33 sub-Saharan African countries, found a negative relationship between real exchange rate misalignment and economic performance. They concluded that inappropriate exchange-rate policies appeared to be one of the important factors that contributed to the economic distress in virtually all sub-Saharan African countries. In corroboration, Klau (1998) found that one of the main causes of poor economic performance in the CFA zone from the mid-1980s to the early 1990s was overvaluation of the CFA franc during that period.

In a recent study, Tarawalie (2010) examines the impact of the real effective exchange rate on economic growth in Sierra Leone. The results suggest that the real effective exchange rate correlates positively with economic growth, with a statistically significant coefficient. The results also indicate that monetary policy is relatively more effective than fiscal policy in the long run, and evidence of the real effective exchange rate causing economic growth was profound in Sierra Leone.

Building a macro-econometric model of the Nigerian economy, Kuijs (1998) uses quarterly data (1983:1–1996:4) to analyse the behaviour and determinants of inflation, exchange rate and real output in the country. The ECM result for the real output equation revealed that an increase in the supply of foreign exchange increases output in the short run, while changes in real exchange rate are found to have no significant effect on short run output. In a similar study, Oduola & Akinlo (2001) also exploit quarterly data (1970:1–1995:4) to investigate the link among depreciation of the Naira, inflation, and real output in Nigeria, using the VAR approach. Their results showed that exchange rate depreciation had an expansionary effect on real output in both the medium term and the long term. Obansa, Okoroafor, Aluko, & Eze (2013) examine the relationship existing among exchange rate, interest rate and economic growth in the Nigerian economy over the period 1970–2010. The result indicates that exchange rate has a stronger impact on economic growth than Interest rate. The study concludes that exchange rate liberalization is good for Nigerian Economy as it promotes economic growth. On the other hand, interest rate liberalization does not make an appreciable impact on economic growth as it undermines investment drive.

#### *3.2.4. Growth vs External Debt*

In various theoretical models, reasonable levels of current debt inflows are expected to have a positive impact on growth. But then in most of the empirical works a negative effect is always reported between external debt and growth. For example, Schclarek (2004) finds that in the case of developing countries, higher growth rate is associated with a relatively lower external debt levels and this negative relationship is mainly driven by public external debt rather than private external debt. Similarly, while investigating the impact of external indebtedness on economic growth for Sudan, Mohamed (2005) uses a time series data from 1978–2002. He concludes that external debt deters economic growth in the country.

In their study on the Nigerian economy, Adepoju, Salau & Obayelu (2007) investigate the debt management effect on growth and development by analyzing time series data for the country over a period from 1962 to 2006. The study concludes that accumulation of external debt hampered economic growth in Nigeria. Also, Ajayi & Oke (2012) investigate the effect of external debt burden on economic growth and development of Nigeria. Their finding indicates that external debt burden has an adverse effect on the per capita income of the nation. Furthermore, Abdullahi, Aliero & Abdullahi (2013) analyses the relationship between external debt and economic growth in Nigeria, using time series data for the period 1970–2009. The study concludes that the non-

existence of long run relationship between external debt and economic growth in Nigeria indicates that increase in external debt could result to decrease in GDP.

#### 4. Methodology

This study employs econometrics methodology of co-integration, Granger causality tests (Granger, 1969; 1986) and error correction mechanism (ECM). As such, in an attempt to avoid a spurious outcome from the regression on the series, the Augmented Dickey-Fuller (ADF) unit root test (Dickey & Fuller, 1979) was carried out on the data. This was conducted at level and at first difference as depicted in table 1. Thus, implying that, the series are I(1). Essentially, after the stationarity of the series was ascertained, a further step in line with Granger (1969) led to the determination of causality between each pair of the variables via the Granger causality test.

Also, the long-run analysis of the relationship between macroeconomic stability factors and economic growth in Nigeria between 1980 and 2011 is established using the Engle-Granger (1987) cointegration two procedures test. The first procedure involves generating residual or error correction term (ECT) while the next procedure requires subjecting the error correction term (ECT) to unit root test analysis with the null hypothesis “no stationary at level”. The rejection of this hypothesis in turn leads to the rejection of the null hypothesis “no-cointegration” that is, no long-run convergence among the series. Then the adjustment analysis that follows involves the process of achieving the objective of this study by carrying out an Error Correction Mechanism (ECM) model. This involves the estimation of equation (2) with the incorporation of the estimated error correction term (ECT). It is thus the co-efficient of the error term obtained from the result of the ECM model that indicates the speed of adjustment to long-run equilibrium for any divergence in the short-run among the series.

##### 4.1. Data Set

Due to problem of data availability, this study considers four of the five Maastricht Criteria identified as macroeconomic stability factors. Thus, real gross domestic product (RGDP), Inflation (INF), log of real exchange rate (LRER), real interest rate (RIR), and log of external debt (LDBT) are the variables employed. Real exchange rate and external debt were necessarily transformed to their logarithm forms in order to make them conform to the same unit of measurement. Yet, inflation was retained in its form as it is an already transformed consumer price index (CPI). Real GDP and real interest rate are also not transformed due to some negative values included in the series. As such, the data set consists of annual time series obtained from the publications of International Monetary Fund (IMF), International Financial statistics (IFS), World Bank national accounts data, and OECD National Accounts data files.

##### 4.2. Model Specification

Since the effects of the stability criteria on growth in Nigeria constitute the core objective of this study therefore, inflation rate, log of real exchange rate, real interest rate, and the log of external debt are regressed on real gross domestic product. Thus, the functional relationship among the variables is specified as

$$RGDP_t = f(INF_t, LRER_t, RIR_t, LDBT_t) \quad (1)$$

Also, in order to ascertain the effects of the macroeconomic stability factors on economic growth in Nigeria, the following model is represented in the form

$$RGDP_t = \beta_0 + \beta_1 INF_t + \beta_2 LRER_t + \beta_3 RIR_t + \beta_4 LDBT_t + \varepsilon_t \quad (2)$$

where  $\beta_0, \dots, \beta_4$  are coefficients,  $\varepsilon$  is error term while  $t$  is time.

#### 5. Empirical Results

The results of the Augmented Dickey-Fuller unit root test, as depicted in table 1, show that aside from RGDP that was stationary at level with intercept, and RIR that was stationary at level with none, other variables were stationary at first difference<sup>1</sup>. Also, the results from the Granger causality test, as presented in Appendix 1, however, fail to affirm any strict causality between certain variables as it shows a one way causal effect between each pair of the following variables: RGDP granger causes LRER at 5 per cent; RGDP granger causes LDBT at 5 per cent; INF granger causes RIR at 5 per cent; RIR granger causes LRER at 10 per cent; and LDBT granger causes RIR at 10 per cent at the lag length of 2. Also at the same lag length, the results on the other hand show a

<sup>1</sup> The results, not reported for the sake of brevity, obtained using the Phillips-Peron as well as DF-GLS unit root tests are similar to the Augmented Dickey Fuller statistics.



“no causality” relationship between: RGDP and INF; RGDP and RIR; INF and LRER; INF and LDBT; and LRER and LDBT.

**Table 1: Augmented Dickey-Fuller Unit Root Test for All Variables**

Variable	Stage	Critical Value	1%	5%	10%
RGDP	Level with Intercept	-3.840082	-3.661661	-2.960411	-2.619160
INF	1st Difference	-5.588201	-2.647120	-1.952910	-1.610011
LRER	1st Difference	-4.239108	-2.644302	-1.952473	-1.610211
RIR	Level	-4.981387	-2.641672	-1.952066	-1.610400
LDBT	1st Difference	-3.705575	-2.644302	-1.952473	-1.610211

Furthermore, the error correction mechanism (ECM) model, as shown in appendix 2, opines that the error correction term (ECT) is statistically significant with negative coefficient as expected. The magnitude of the coefficient, however, implies that the series adjust quickly to equilibrium in case of any short-term disequilibrium. The model further depicts a positive statistically significant effect of real interest rate on growth such that a one percentage increase in real interest rate would bring about an 11.9 percentage rise in economic growth in Nigeria. In addition, the results show a negative, but not significant, individual effect of real exchange rate and external debt on growth in the country. By implication, it means growth is affected negatively by real exchange rate and as well by external debt over the period 1980 to 2011 in the country.

## 6. Concluding Remarks and Recommendations

This study has empirically examined the growth effect of inflation, real exchange rate, real interest rate, and external debt in Nigeria over the period 1980-2011. It could be inferred from the results that the Maastricht criteria may not be achieved together simultaneously in Nigeria because some of the factors are not significant in determining growth in the country. The implication of this draws from the fact that Nigeria is a developing country where developed countries' prescriptions would not fit or work. Also, it implies that for macroeconomic stability to be achieved in Nigeria, each of the factors need to be examined individually such that its relative effect on growth could be identified and appropriate policy would be formulated and implemented where required.

Essentially, findings from the study show that real interest rate is statistically significant and impacts positively on economic growth over the period considered in the country. This by implication means that real interest rate should be kept fairly positive in order to achieve increased growth in the country. The monetary policy committee (MPC), therefore, needs to keep the monetary policy rate (MPR) at around growth-friendly level as a necessary condition for achieving macroeconomic stability in the country. While setting the rate, however, the MPC should also not lose focus on the effect of the rate on investment as any rate that discourages investment would have adverse effect on growth. In addition, the country needs to pursue vigorously its policy on debt reduction and also intensify its drive for outright debt cancellation so as to improve the level of economic growth since a negative relationship is established between external debt and growth.

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### Appendix 1: Pairwise Granger Causality Tests on All the Variables

Null Hypothesis:	Lag	F-Statistic	Decision
INF does not Granger Cause RGDP	2	0.02994	Accept
RGDP does not Granger Cause INF		0.15189	Accept
LRER does not Granger Cause RGDP	2	0.68140	Accept
RGDP does not Granger Cause LRER		4.67738	Reject**
RIR does not Granger Cause RGDP	2	1.15974	Accept
RGDP does not Granger Cause RIR		0.07501	Accept
LDBT does not Granger Cause RGDP	2	0.90811	Accept
RGDP does not Granger Cause LDBT		4.93484	Reject**
LRER does not Granger Cause INF	2	1.27214	Accept
INF does not Granger Cause LRER		0.48311	Accept
RIR does not Granger Cause INF	2	0.78443	Accept
INF does not Granger Cause RIR		3.72224	Reject**
LDBT does not Granger Cause INF	2	1.62449	Accept
INF does not Granger Cause LDBT		0.14008	Accept
RIR does not Granger Cause LRER	2	2.89547	Reject*
LRER does not Granger Cause RIR		1.04007	Accept
LDBT does not Granger Cause LRER	2	0.69190	Accept
LRER does not Granger Cause LDBT		1.61113	Accept
LDBT does not Granger Cause RIR	2	2.68048	Reject*
RIR does not Granger Cause LDBT		0.50296	Accept

\*\* and \* signify statistical significance at 5% and 10%, respectively.



### Appendix 2: Error Correction Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.187119	0.683314	0.273840	0.7866
D(LRER)	-3.545868	2.544017	-1.393807	0.1761
D(LRER(-1))	-1.973283	2.192326	-0.900087	0.3770
D(RIR)	0.119305	0.040567	2.940978	0.0071
D(LDBT)	-1.888559	1.830224	-1.031873	0.3124
ECT(-1)	-0.880834	0.171018	-5.150548	0.0000
R-squared	0.570825	Mean dependent var		0.683000
Adjusted R-squared	0.481413	S.D. dependent var		5.041019
S.E. of regression	3.630188	Akaike info criterion		5.593302
Sum squared resid	316.2783	Schwarz criterion		5.873542
Log likelihood	-77.89953	Hannan-Quinn criter.		5.682953
F-statistic	6.384244	Durbin-Watson stat		1.825327
Prob(F-statistic)	0.000665			

Source: Author's computation using E-views 7.

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