

AGRICULTURE FINANCING AND ECONOMIC GROWTH IN NIGERIA

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Abstract

The importance of agricultural surplus for the structural transformation accompanying economic growth is often stressed by development economists. This lead to the question: Does agriculture financing matters in the growth process? To this end, the need to investigate the impact of agriculture financing on economic growth appears more imperative for Nigeria. This paper employed secondary data and some econometric techniques such as Ordinary Least Square (OLS); Augmented Dickey-Fuller (ADF) unit root test; Granger Causality test. The results of the various models used suggest that there is bidirectional causality between economic growth and agriculture financing; and there is bidirectional causality between economic growth and agricultural growth. It further suggests that productivity of investment will be more appropriately financed with foreign direct private loan, share capital, foreign direct investment and development stocks. And also capital-output ratio will be more appropriate financed with multilateral loan, domestic savings, Treasury bill, official development assistant, foreign direct investment and development stock. It is recommended that maintenance of credible macroeconomic policies that is pro-investment; and debt-equity swap option are necessary for a agricultural-led economic growth.

Keywords: Agricultural financing, Economic growth, investment productivity

Introduction And Statement Of Problem

In Nigeria, agriculture remains the mainstay of the economy since it is the largest sector in terms of its share in employment (Philip, Nkonya, Pender and Oni 2009). In an effort to diversify her oil base economy, Nigeria is placing much emphasis on financing other sectors most especially agricultural sector, since agriculture has the potential to stimulate

economic growth through provision of raw materials, food, jobs and increased financial stability. It follows that agriculture financing is one of the most important instruments of economic policy for Nigeria, in her effort to stimulate development in all directions. Finance is required by agricultural sector to purchase land, construct buildings, acquire machinery and equipment, hire labour, irrigation etc. In certain cases such loans may also be needed to purchase new and appropriate technologies. Not only can finance remove financial constraints, but it may also accelerate the adoption of new technologies.

Agriculture Financing Sources

Agriculture financing is mainly a long-term financing (that is, capital structure) that aims at inducing agriculture-led growth and development in an economy. Long-term foreign capital flows take several different forms. The broad groups include foreign direct investment, portfolio equity investment, official development assistance and foreign loans. The last of these groups can be further sub-divided into development loan stocks, loans from bilateral, multilateral and international capital market, bond finance, and other private loans.

Long-term domestic capitals include domestic public and private savings, gains from international trade, loan and advances from domestic banks, domestic public and private debt and share capital. Figure 1 below explains clearly various agriculture financing options.

Figure 1: Agriculture Financing Sources

Agriculture Financing Sources ↳▶	Domestic	Non- debt	Repatriated Capital, Agric share capital, Savings, equity investment etc.
	↳▶	Debt	Bank loans and advances, Treasury bill, development stock, treasury certificate, etc.
	External	Non- debt	Foreign Direct Investment, foreign Aid, foreign private investment etc.
	↳▶	Debt	Multilateral, bilateral, unilateral debts, foreign private loans, development Bank loans etc.

Source: Constructed by the authors

However, the growth of output of any economy depends on capital accumulation, and capital accumulation requires investment and an equivalent amount of domestic and external finance to match it. Two of the most important issues in development economics, and for developing countries, are how to stimulate investment, and how to bring about an increase in the level of domestic financial resources to fund increased investment.

Agriculture financing is essentially a development strategy in a variety of ways. It promotes agricultural investment and adoption of technology necessary to spur economic growth. Although agriculture finance is only one of the growth factors, it is one of the more important factors in attaining the objectives for development. Chenery and Strout (1966) assume that there is an excess supply of labour, and growth is only constrained by availability and productivity of capital in developing countries.

According to Mallik (2008) three gaps were identified as constraints to growth in most African countries. The gaps are (i) savings gap, (ii) trade balance gap and (iii) fiscal gap. In general, most African countries (Nigeria inclusive) have inadequate levels of domestic savings, which could be directed to investment. They also have insufficient export earnings required to import capital goods for investment and do not have the revenue raising capacity to cover a desired level of public investment.

Table 1.1: Investment and Foreign Exchange Gaps in Nigeria

Year	Investment- Savings gap	Import-Export gap
1970-72	-209.97	575.23
1973-75	544.77	1765.27
1976-78	2129.37	6165.5
1979-81	5369.6	9087.767
1982-84	5120.37	8473.7
1985-87	-3250.87	7856.97
1988-90	6393.7	24834.87
1991-93	11677.33	105300.9
1994-96	-35286.43	356138.8
1997-99	51149.37	636135.37
2000-02	-87485.47	962900.07
2003-05	246258.27	1679919.77
2006-08	344132	3548465.17

Source: Computed by the authors

For the target rate of growth to be achieved there would have be external financing (either as foreign investment or foreign borrowing) to fill the gaps. The importance of external financing notwithstanding, studies has shown that the developing countries (Nigeria inclusive) are facing external financing problems (Ariyo, 1999). These can arise either from source of and/or mix of the finance. According to Rostow (1982) the right quality and mixture of financing is necessary to enable developing economies proceed along the same

economic growth path which was followed by developed economies. To this end, the principal component of interest of this study is to investigate and suggest agriculture financing options that can induce desired economic growth in Nigeria. The research questions in relation to agriculture financing and economic growth in Nigeria may therefore be as follows: what are the sources of agriculture financing in Nigeria? How does agriculture financing affect the economic growth in Nigeria?

There have been many studies on the relationship between finance and economic growth (Ariyo 1999; Thirlwall, 1976; Beck, Levine and Loayza, 2000). These studies conclude that agriculture financing has impact on economic growth especially in developing countries. Some studies have attempted to look specifically at long term financing for agricultural sector (Antonio and Agnes, 1994; Mody 1981; Rao 1978; Narayan, 1994). They observed that long-term financing for agriculture is urgently needed by developing economies, as the stages of their respective economic development are either still early or well into the transition. Most of the studies mentioned above on this subject matter have employed simple descriptive assessment of some relevant indices.

This study improves on the existing literature both in terms of econometric techniques and data. Other studies that empirically assess the relationship did not explicitly confront the issue of causality and simultaneity bias (Akujuobi, 2007; Adesoye, Maku, and Atanda, 2011). This study will use two econometric techniques to confront the issue of causality and to control for the simultaneity bias that may arise from the investigation. This study would therefore improve on existing literature in this issue

This study is arranged into five sections. Section one which is the introduction; section two is the literature review and theoretical framework. Section three is the methodology. Section four is interpretation of estimated results, while section five is policy implication, recommendations and conclusion.

Literature Review

Conceptual Issues

Agriculture finance refers to (public or private) resources (in form of equity, gift or loan) for improving social welfare through development of agricultural sector (Shreiner and Yaron, 2001). It encompasses not only government funds but also funds of non-governmental organizations that use matching grants to attempt to promote community and sector development, income equality and local empowerment. Public funds are subsidized funds and private funds regardless of their price, are not subsidized, unless a contribution is tax free or

the market price is affected by an explicit or implicit state guarantee of the liabilities of a development finance institution (Shreniner and Yaron, 2001).

Agriculture financing can be divided into the non-debt (non –leverage) and debt (leverage) categories. Thirlwall (1976) states that Debt represents funds with fixed contractual financial obligations, to which the resources of a nation might be plead as collateral. To cope adequately, in the long-run, a nation's debt- servicing capacity must grow at a rate not less than the growth rate of its debt burden (Ariyo, 1999). Non-debt funds on the other hand, do not impose fixed or compulsory servicing obligations on the nation. The regularity and magnitude of non-debt resource flows, however, depend on perceived country risk, relative investment yield and enabling factors such as the quality of governance (Ariyo 1999).

Professor Simon Kuznets, a Nobel Prize winner defines a country's economic growth as "a long term rise in capacity to supply increasingly diverse economic goods to its population; this growing capacity is based on advancing technology, and the institutional and ideological adjustments that it demands" (Todaro, 1992). This definition implies that economic growth is synonymous with a sustained rise in national output, provision of wide range of economic goods, presence of improved technology and institutional, attitudinal and ideological adjustments.

Finance, Agriculture and Economic growth Nexus.

This nexus based on the economic development experience of developed countries. As often stressed by development literature, agricultural surplus is important for the structural transformation accompanying economic growth (Moody, 1981). This is based on the view that the agricultural sector should transfer to the non-agricultural sector the 'surpluses of 'investible' resources generated in agriculture (Kuznets, 1961). On this basis, it is suggested (implicitly or explicitly) that developing countries must extract resources from agriculture for successful industrial development (Ohkawa and Rosovsky 1996; Mellor, 1973; Johnston and Kilby, 1975).

The appropriate indicator of the phase of development would therefore be the share of agriculture in the national product. Kuznets (1966) states that during the early phase of modern economic growth the share of agriculture in the national product is around 50%. Landes (1965) reports that in the year of Britain's industrial revolution agriculture was taking as much capital as giving. Mody (1981) argues that this resource flow into agriculture became necessary because the changes in land tenure and improvement in techniques that made agricultural growth possible required substantial outlays of capital. Thus, capital was

required for land clearing, drainage, cost of enclosure and consolidation, fencing, building, equipment, roads etc. To this end, agriculture financing not only removes financial constraints but also promote investment and adoption of technology necessary to spur desired economic growth.

Agriculture Financing and Economic Growth.

On a priori basis, the theories of link between finance and economic growth can be traced back to the work of Schumpeter (1912) and more recently to Goldsmith (1969); Shaw (1973) and Mckinnon (1973); King and Levine (1993). These studies show a positive relationship between finance and economic growth.

Demetriades and Hussein (1996) find the evidence that finance is a leading factor in the process of economic growth. They further found that for the majority of the countries, causality is bi-directional, while in some cases finance follows economic growth. Luintel and Khan, (1999) state that the causality between financial development and output growth is bi-directional for all countries they studied. Rajan and Zingalas, (1996) look at the structure and sources of company finance, also conclude that the development of the financial sector facilitates the growth of corporate sector. In contrast, Robinson (1952) states that “where enterprise leads finance follows”. According to this view, economic development creates demands for particular types of financial arrangements.

In spite of the above arguments finance remains the key to the region's investment and hence growth. As World Bank (1989) argues, savings determines the rate at which productive capacity and income can grow. In particular, long-term finance tends to be associated with higher productivity and growth (Caprio and Demirguc-Kunt, 1998).

Reisen and Soto (2001) argue that capital flows (external funds) can magnify existing distortions in capital allocation, that is, if domestic financial systems do not function properly, capital flows will not end up in the right places and will cause problems in the places they do end up. And some capital flows are subject to quick reversal. In extreme cases these reversals can results in the occurrence of the different forms of crises: currency and banking crises, (Joel, 2005). On the other hand, once a macroeconomic stabilization has been completed and positive GDP growth resumes, large capital inflows are fairly common. Such inflows come from foreign borrowing, portfolio investments, deposit inflows and foreign direct investments and finance both investment and consumption (Wachtel, 1998)

Ariyo, (1999) asserts that in practice, governments employ a combination of debt and non-debt sources to varying degrees. Available evidence further indicates that (external) debt seems the most easily accessible source of financing to Sub-Saharan African (SSA) countries.

Nevertheless, studies suggest that debts in general and external debts in particular, may aggravate the problem of underdevelopment of developing economies. This view is buttressed by the widespread unsustainable debt profile coupled with economic retardation of nearly all SSAs (Ajayi, 1991; Ariyo, 1993; Buitter, 1983; Wickens and Uctum, 1990).

Savvides (1992) asserts that if debtor country is unable to pay its external debt, debt payments become linked to the country's economic performance. The country benefits only partially from an increase in output or exports because a fraction of increase is used to service the debt and accrues to the creditors. Thus, from the perspective of the debtor country as a whole, the debt overhang acts like a high marginal tax rate on the country, thus lowering the return to investment and providing a disincentive to domestic capital formation (private saving and investment).

Henry and Lorentze (2004) argue that debt rather than equity (non-debt) is a cause of instability, because debt differs from non debt, contracts in that they require periodical payments of interest. To this end, Fisher (1987) had argued that rigid debt contracts in combination with unexpected information were the main reason for the outbreak and prolongation of the Latin American debt crisis. Williamson (1997) opines that when adverse information becomes available, the capital flows resulting from debt contracts are thus procyclical: money leaves that country when times are bad, and comes in when they are good.

Some study argued that foreign aid assists to close the exchange gap, provides access to modern technology and managerial skills, and allows easier access to foreign market (Chenery and Strout 1966; Over, 1975, Levy 1988; Islam, 1993). On the other hand, other studies related to the emergence of the view that external capital exerts significant negative effects on economic growth of recipient countries, argued that foreign aid is fully consumed and substitutes rather than compliments domestic resources. They further stated that foreign aid assists to import inappropriate technology, distorts domestic income distribution, and encourages a bigger, inefficient and corrupt government in developing countries (Griffin, 1970; Weisskoff; 1972; Boone, 1994; Easterly, 1999).

Bagehot (1873) and Hicks (1969) argued that the financial system played a critical role in igniting industrialization in England by facilitating the mobilization of capital for 'immense work'.

Empirical Evidence

Mallik (2008) conclude that a long run relationship exists between per capita real GDP, aid as a percentage of GDP, investment as a percentage of GDP and openness.

However, long run effect of aid on growth was found to be negative for most of the countries he examined.

On the other hand, Hatemi-J and Irandoust (2005) in their study “relationship between foreign aid and economic growth in developing Countries –Botswana, Ethiopia, India, Kenya, Sir-lanka, and Tanzania” reveals that foreign aid has a positive and significant effect on economic activity for each country in the sample. They conclude that foreign capital flows can have a favorable effect on real income by supplementing domestic savings.

Oyejide (1999) in his study, “taking stock of long-term financing for sustainable development in Africa” argues that that the SSA region's poor economic growth performance since the mid-1970s is not unrelated to its low investment rates. In addition, he suggested that since the region's domestic savings have been inadequate for financing even these low investment rates, it has historically relied rather heavily on external resource inflows. It is tempting, in these circumstances, to suggest that the solution to the growth problem in the SSA region is increased investment that is financed even more than in the past by inflow of foreign capital, both official and private.

According to Prasad *et. al.* (2004) there is series of theoretical advantage of openness to capital flows, the most important being the enhanced pool of savings available for investment. kose *et.al.* (2008), finds that financially open economies have higher productivity growth.

Were (2001) finds that Kenya has a debt overhang problem and that country's external debt has negative impact on economic growth and private investment.

However, Athukorala and Rajapatirana (2003), finds that an increase in FDI leads to real exchange rate depreciation in Latin America and Asia whereas Lartey (2007) reveals that FDI causes real exchange rate appreciation in sub-Saharan African.

Recent theoretical research, typified by endogenous growth models, suggests that high investment rates can result in a permanent increase in an economy's overall growth rate (Roemer, 1986; Lucas, 1988).

The credibility of macroeconomic policy may be perceived through at least three main indicators: inflation rate and its variability; real exchange rate variability; and sustainability of fiscal balance. These three indicators interact with an economy's degree of openness trade and the ease of cross-border financial transfers, as moderated by foreign exchange control regulations.

High inflation, for instance, make domestic asset holders react to the erosion of the real value of their assets by moving their assets abroad. Also, since inflation is often regarded

as an indicator of the government overall ability to manage the economy (Fischer, 1993), a rising inflation rate tends to undermine that ability. Most empirical studies have found evidence of a positive relationship between capital flow and inflation, but such a relationship was not statistically significant for African countries (Murinde *et al.*, 1996; Lensink *et al.*, 1998; Olopoenia, 2000; Nyoni, 2000; Ndikumana and Boyce, 2002).

Capital flow may also be stimulated by exchange rate fluctuations and volatility, which in itself can also be influenced by inflationary pressures. For instance, high inflation may create increasing expectations about future exchange rate depreciation, and may provide incentives for capital flight. While Hermes and Lensink (1992) found a strong support for a positive link between real effective exchange rate and capital flight in Cote d'Ivoire, Nigeria, Sudan, Tanzania, Uganda, and Zaire (now Democratic Republic of Congo) for the period 1978-88.

The level of exports, adjusted for country size, reflects the economy's openness, and openness generally is good for growth (Sachs and Warner, 1995b, Edwards, 1998 and Frankle and Romer, 1999). Gylfason (2000) opines that the link between openness and growth is through inflation, however, one of the reasons why inflation is inversely related to growth, may well be that inflation hurts export through the real exchange rate, all else being the same.

According to Gylfason (2000) sustained economic growth requires high-quality saving and investment. High net saving rate do not necessarily stimulate growth if they are accompanied by rapid depreciation and depletion of capital.

Fry, (1995), Mckinnon (1973) and Shaw (1973) in their studies show that positive real interest rate stimulates saving and financial intermediation thereby increase supply of credit to be allocated to productive sectors. This, in turn, increases investment and economic growth.

Theoretical Framework

It has been established that capital imports can raise the growth rate, but we have not considered how capital imports are financed and how the terms of borrowing may affect the growth rate. A model which incorporates these considerations is developed by Thirlwall, (1983) as presented thus;

$$\text{Let } O = Y + rD \quad (1)$$

where O is output, Y is income, r is the interest rate, and D is debt. The difference between domestic output and national income is factor payments abroad. From equation (1) we have:

$$\Delta O = \Delta Y + r\Delta D \tag{2}$$

Now

$$\Delta O = \sigma I \tag{3}$$

Where σ is the productivity of capital, and

$$I = sO + \Delta D - srD \tag{4}$$

and s is the propensity to save. Substituting equation (4) into (3).

$$\Delta O = \sigma(sO + \Delta D - srD) \tag{5}$$

and dividing by O gives an expression for output growth of:

$$\frac{\Delta O}{O} = \sigma \left[s + \frac{\Delta D - srD}{O} \right] \tag{6}$$

or

$$\frac{\Delta O}{O} = \sigma s + (\sigma - r) \frac{\Delta D}{O}$$

Equation (6) shows that the growth of output ($\Delta O/O$) will be higher than the rate obtainable from domestic saving alone as long as $\Delta D > srD$, that is as long as new inflows of capital exceed the amount of outflow on past loans that would otherwise have been saved. On the other hand, making the rate of growth of income as the dependent variable, then from equation (1) we have:

$$\Delta Y = \Delta O - r\Delta D \tag{7}$$

Substituting (4) into (3) and the result into (8) gives:

$$\Delta Y = \sigma(sO + \Delta D - srD) - r\Delta D \tag{9}$$

Now since $Y = O - rD$, we can also write (9) as:

$$\Delta Y = \sigma sY + \Delta D(\sigma - r) \tag{10}$$

And dividing through by Y we have an expression for the rate of growth of income of:

$$\frac{\Delta Y}{Y} = \sigma \left(s + \frac{\Delta D - r\Delta D}{Y} \right) \tag{11}$$

or

$$\frac{\Delta Y}{Y} = \sigma s + (\sigma - r) \frac{\Delta D}{Y}$$

Equation (11) shows that the growth of income ($\Delta Y/Y$) will be higher than the rate obtainable from domestic saving alone as long as $\Delta D > srD$, that is as long as new inflows of capital exceed the amount of outflow on past loans that would otherwise have been saved. Equations (6) and (11) lays the basis for agriculture financing and economic growth relationship.

Assumptions of Dual-Gap Analysis

However, Thirlwall (1983) has it that the basic underlying assumption of dual-gap analysis is a lack of substitutability between foreign and domestic resources. This may seem a stringent assumption, but nonetheless may be valid particularly in the short period. If foreign exchange is scarce, it is not easy in the short run to use domestic resources to earn more foreign exchange, or to save foreign exchange by improving the productivity of imports. If it were easy, the question might well be posed: why do most developing countries suffer chronic balance-of-payments deficits over long periods despite vast reserves of unemployed resources? If domestic saving is scarce, it is probably easier to find ways of using foreign exchange to substitute, raising the domestic savings ratio and the productivity of capital.

Methodology

Model Specification

The specification of growth equation for this study is closely related to Thirlwall's model which he derives from the Harrod's growth equation. Our study augmented this equation to include agriculture financing sources. The model for this study has the implicit form:

$$Y_t = (AFS_{ti}, DS_t, \varepsilon_t) \quad (12)$$

Where $(i = 1, 2 \dots n)$

Y_t = economic growth (growth rate of output)

AFS_{ti} = agriculture financing sources (ratio of financing sources to agric RGDP)

DS_t = debt services

ε_t = error term

Data Analytical Technique

To achieve the stated objectives of the study, secondary data were collected in form of annual time series data from Central Bank of Nigeria (CBN) Statistical Bulletin.

The agriculture financing-economic growth relationship will be analyzed using OLS (Ordinary Least Square) technique. The factors influencing financing options will be ascertained with method of instrumental variables because of the system of simultaneous equation. The residual series of the estimated equation is tested for stationarity with Augmented Dickey-Fuller (ADF) unit root test in order to detect long-run relationship between economic growth and agriculture financing options. The time series properties of the variables are examined by ADF unit root test. ADF tests are used to test for the stationarity of the series so as to be sure that we are not analyzing inconsistent and spurious relationships. Granger causality concept is introduced to investigate whether observation of a variable like AGRI (growth of agric. RGDP) is potentially useful in anticipating future movement in

EGR1, and to test Granger Causality between DFR (growth of financing options) and AGRI, between EGR1 and DFR

Output Growth-agriculture financing Equation

To determine the impact of disaggregated agriculture financing options on economic growth in Nigeria the basic regression equation to be estimated takes the form:

$$\ln EGR1_t = \beta_0 + \beta_1 \ln DVSA_t + \beta_2 \ln MLA_t + \beta_3 \ln TBA_t + \beta_4 \ln PLCA_t + \beta_5 \ln NSA_t + \beta_6 \ln FDIA_t + \beta_7 \ln ODAA_t + \beta_8 \ln AFPI_t + \beta_9 \ln AC_t + \beta_{10} \ln DS_t + \varepsilon_t \quad (13)$$

Where

$\ln EGR1_t$ = growth of output (i.e. RGDP growth rate)

$\ln DVSA_t$ = Development stocks ratio of agric. RGDP

$\ln MLA_t$ = Multilateral debt source ratio of agric. RGDP

$\ln TBA_t$ = Treasury bill ratio of agric. RGDP

$\ln PLCA_t$ = Paris and London clubs ratio of agric. RGDP

$\ln NSA_t$ = Domestic Savings ratio of agric. RGDP

$\ln FDIA_t$ = Foreign Direct Investment ratio of agric. RGDP

$\ln ODAA_t$ = Official Development Assistant ratio of agric. RGDP

$\ln AFPI_t$ = Agric. Foreign Private Investment

$\ln AC_t$ = Agric. capital

$\ln DS_t$ = debt services

\ln = Natural Logarithm

ε_t = error term

Note: Equation 13 is further divided into two namely: Debt and Non-Debt

Determinants of financing Equation

To determine the factors of influencing financing sources in Nigeria the basic regression equation to be estimated takes the form:

$$\ln DF_t = \beta_0 + \beta_1 \ln ER_t + \beta_2 \ln INR_t + \beta_3 \ln FO_t + \beta_4 \ln INF_t + \beta_5 \ln PCI_t + \beta_6 \ln EGR_t + w_t \quad (14)$$

Where

$\ln DF_t$ = total financing sources

$\ln EXR_t$ = Exchange rate

$\ln INR_t$ = Interest rate

$\ln FO_t$ = Financial Openness (ratio of account balance to GDP)

$\ln INF_t$ = Inflation rate

$InPCI_t$ = Per capita income (ratio of NI to population)

$InFDV_t$ = Financial development (ratio of credit to GDP)

$InEGR_t$ = Economic growth

w_t = error term.

However EGR is influenced by DF as well as other factors such as Size of government (GSZ), Investment (INV), Trade openness (TO), agric RGDP growth (AGR). The basic regression equation is:

$$InEGR1_t = \beta_0 + \beta_1 InDF_t + \beta_2 InGS_t + \beta_3 InINV_t + \beta_4 InTO_t + \beta_5 InAGR_t + e_t \quad (15)$$

Where

$InEGR_t$ = Economic growth

$InDF$ = total financing options

$InGSZR$ = Size of government (ratio of GOVEXP to GDP)

$In INVR$ = Investment (capital formation)

$InTOR$ = Trade openness (ratio of trade balance to GDP)

$InAGR$ = agric RGDP growth (Agric RGDP/CF)

e = error term

Consequently, equation (14) cannot be treated as a single-equation and hence a model with simultaneous equation is stated as:

$$InDF_t = \beta_0 + \beta_1 InER_t + \beta_2 InINR_t + \beta_3 InFO_t + \beta_4 InINF_t + \beta_5 InPCI_t + \beta_6 In\hat{E}GR_t + \hat{e}_t + w_t \quad (16)$$

Therefore, the instrumental variables are estimated $\hat{E}GR1$ and the estimated residual \hat{e} of equation (15) (Gujarati, 2003 and Koutsoyiannis, 2001).

It is expected that

$$\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8, \beta_9, \beta_{10} > 0$$

And all the incorporated variables are loglinearized to avoid multicollinearity and also to revert the mean generating process.

Results Nad Interpretation

Impact of Agriculture Financing on Economic Growth

Double log Debt and Non-Debt equation 13

$$INEGR1 = - 4.400 + 0.205INODAA - 0.0571INNSA - 0.716INTBA* - 0.776INDVSA* - 0.988INMLA* + 0.619INPLCA - 0.178INAFPI - 0.486INAC + 0.760INFIDIA* + 0.433INDS*$$

$$R^2 = 0.392; \text{adj } R^2 = 0.158; \text{D-W stat} = 2.273; \text{F-stat} = 1.675; \text{Prob. (F-stat)} = 0.140568$$

Note: Equation 13 is further divided into Debt and Non-Debt

Double log Non-Debt equation 13

$$\text{INEGR1} = - 0.643 + 0.0537\text{INODAA} + 0.267\text{INNSA} - 0.589\text{INAFPI}^* - 0.228\text{INAC} - 0.116\text{INF DIA} + 0.165\text{INDS}$$

$$R^2 = 0.179; \text{adj } R^2 = 0.154; \text{D-W stat} = 1.779; \text{F-stat} = 1.094; \text{Prob. (F-stat)} = 0.388808$$

Double log Debt equation 13

$$\text{INEGR1} = -5.041 - 0.0211\text{INTBA} - 0.191\text{INDVSA} + 0.130\text{INMLA} - 0.625\text{INPLCA}^* + 0.190\text{INDS}$$

$$R^2 = 0.219; \text{adj } R^2 = 0.093; \text{D-W stat} = 2.022; \text{F-stat} = 1.741; \text{Prob. (F-stat)} = 0.154568$$

Determinants of Economic Growth (EGR)

Double log equation 15

$$\text{INEGR1} = 0.154 + 0.734\text{INAGR1}^* + 0.444\text{INGSZR}^* - 0.117\text{ININVR}^* + 0.246\text{INTOR}^* - 0.113\text{INDFR}$$

$$R^2 = 0.498; \text{Adj } R^2 = 0.437; \text{D-W stat} = 2.047; \text{F-stat} = 8.169; \text{Prob. (F-stat)} = 0.000108$$

Determinants of Financing

Double log Equation 16

$$\text{IN DF} = 4.900684875 + 0.0422\text{ININF} + 0.488\text{INEXR}^* + 0.983\text{INF DV}^* - 0.0237\text{INFO}^* + 0.496\text{ININR}^* + 0.532\text{INPCI}^* - 0.229\text{EGREST}^* + 0.227\text{RESEGR}^*$$

$$R^2 = 0.986; \text{adj } R^2 = 0.981; \text{D-W stat} = 1.429; \text{F-stat} = 243.12; \text{Prob. (F-stat)} = 0.000000$$

Stationary Test

Table 4.1 ADF Stationary Test Result

Variable	Level	1 st diff.	2 nd diff.	order of integration
DF	-	-1.3997***	-	1(1)
INF	-	-0.6526**	-	1(1)
INR	-	-1.4566***	-	1(1)
EXR	-	-0.9077***	-	1(1)
AFPI	-	1.0498***	-	1(1)
AC	-	-0.7097*	-	1(1)
FDV	-	-0.9699***	-	1(1)
TO	-	-0.8272***	-	1(1)

FO	- 1.0347** *	-	-	1(0)
DS	- 1.3818** *	-	-	1(0)
INV	0.6882** *	-	-	1(0)
PCI	-	-0.9652****	-	1(1)
GSZ	-	-1.5620****	-	1(1)
EGR1	- 0.9520** *	-	-	1(0)
ODAA	-0.6048**	-	-	1(0)
NSA	0.4210**	-	-	1(0)
TBA	-	-1.4357****	-	1(1)
DVSA	-	-0.9303****	-	1(1)
MULA	-	-1.2025****	-	1(1)
PLCDA	-	-1.2344****	-	1(1)
FDIA	-	-1.1867****	-	1(1)
AGR1	- 0.9836** *	-	-	1(0)
TOR	- 0.646026 **	-	-	
DFR	- 0.850958 ***	-	-	
GSZR	-	- 1.225649* **	-	
INR	-	-	-	

		0.730070*		
		**		

Table 4.2: Pairwise Granger Causality Tests

Direction of causality	Obs.	F-Statistic	Probability
AGR1 → EGR1	37	1.86999	0.18045
EGR1 → AGR1		3.29498	0.07832
DFR → EGR1	37	0.06972	0.79333
EGR1 → DFR		1.37588	0.24896
DFR → AGR1	37	2.56909	0.11822
AGR1 → DFR		1.46724	0.23413

Interpretation of Results

ADF unit root test, as presented in table 4.1, shows that the variables are stationary at level and first difference. The order of integration is shown in the table 4.1. Most of the variables are statistically stationary at 1%, while the rest at 5% and 10%. The ADF tests of residual series of the estimated equations confirm the existence of a long run equilibrium relationship between the variables (see appendix).

The Pairwise Granger causality test, as presented in table 4.2, shows that there is a bilateral directional relationship between EGR1 and AGR1 (growth of agric. RGDP); Causality is bi-directional between DFR (growth of financing options) and AGR1 and Causality is unidirectional from EGR1 to DFR (all at 25% level of significant); the critical F value is 1.38 (1 and 33 df.). With regard to relationship between DFR and EGR1 analysis shows that there is no evidence of reverse causation from DFR to EGR1.

Impact of Agriculture Financing Options on Economic Growth

The first regression explores the impact of agriculture financing on output growth. The result, as presented in equation 13, shows that some of the variables were found to be statistically significant, namely TBA, MLA, DVSA, FDIA, and DS. The rest of the variables ODAA, NSA, PLCA, and AC were not statistically significant in explaining EGR1. Similarly, all the explanatory variables have hypothesized signs, except NSA, DVSA, AC, TBA, MLA, and AFPI. However, the coefficients on MLA, DVSA, and TBA inflows are negative and statistically significant, suggesting that an increase in MLA, DVSA, and TBA inflows adversely affect EGR1. The coefficient on FDIA inflows is positive and statistically significant, suggesting that an increase in FDIA inflows will cause increases in EGR1. We also find that the coefficient on DS is positive and statistically significant. The positive coefficients on ODAA and PLCA, suggest that an increase in ODAA, and PLCA inflows will

cause increase in EGR1. Similarly, negative coefficients NSA, AC, and AFPI suggest that an increase in NSA, AC, and AFPI inflows adversely affect EGR1.

The result, as presented in non-debt equation 13, shows that AFPI was found to be statistically significant while FDIA, ODAA, NSA, AC and DS were not statistically significant in explaining EGR1. Similarly, all the explanatory variables have hypothesized signs, except AC, FDIA, and AFPI

The result, as presented in debt equation 13, shows that PLCA was found to be statistically significant while MLA, TBA, DVSA and DS were not statistically significant in explaining EGR1. Similarly, all the explanatory variables have hypothesized signs, except DVSA, PLCA, and TBA

The coefficient of determination relating to goodness of fit, measured by the R^2 indicates that 39 percent of the variations in RGDP growth rate are explained by the independent variables during the period of the study. The F-statistic of 1.675 with a corresponding probability of 0.140568 is an indication that the model is well specified. The Durbin-Watson statistics of 2.273 indicate that autocorrelation is not a problem in our specification. The ADF unit root test for the residual series of equation 13 shows that the model is stationary at level. This is true since the beta coefficient is significantly negative and higher than Mackinnon critical value; and ADF test statistic is lower as compare to Mackinnon critical value (Upender, 2004). This implies that long-run relationship exists among the variables and the model is stable over a long-run period (see appendix).

Determinants of Economic Growth and Financing

The regressions explore the determinants of output growth and determinants of financing respectively. The result, as presented in equation 15, shows that several of the variables were found to be statistically significant, namely, TOR, AGR1 GSZR, and INVR while DFR is not statistically significant in explaining EGR1. Similarly, all the explanatory variables have hypothesized signs, except INVR and DFR. On the hand, the second regression explores the determinants of financing and the result, as presented in equation 16, shows that several of the variables were found to be statistically significant, namely, EXR, FDV, FO, INR, PCI EGREST and RESEGR while INF is not statistically significant in explaining DF. Similarly, all the explanatory variables have hypothesized signs, except FO and EGREST.

$$R^2 = 0.498; \text{ Adj } R^2 = 0.437; \text{ D-W stat} = 2.047; \text{ F-stat} = 8.169; \text{ Prob. (F-stat)} = 0.000108$$

$$\begin{aligned} \text{IN DF} &= 4.900684875 + 0.0422\text{ININF} + 0.488\text{INEXR}^* + 0.983\text{INFDV}^* - 0.0237\text{INFO}^* + \\ &0.496\text{ININR}^* + 0.532\text{INPCI}^* - 0.229\text{EGREST}^* + 0.227\text{RESEGR}^* \\ R^2 &= 0.986; \text{adj } R^2 = 0.981; \text{D-W stat} = 1.429; \text{F-stat} = 243.12; \text{Prob. (F-stat)} = \\ &0.000000 \end{aligned}$$

The EGREST and RESEGR were statistical significant. RESEGR has the expected positive sign except EGREST. The statistical significant of EGREST and RESEGR do not support rejection of hypothesis of simultaneity bias. The ADF unit root test for the residual series of equation 15 & 16 show that the model is stationary at level and 5% respectively. This is true since the beta coefficient is significantly negative and higher than Mackinnon critical value; and ADF test statistic is lower as compare to Mackinnon critical value (Upender, 2004). This implies that long-run relationship exists among the variables and the model is stable over a long-run period (see appendix).

Policy Implications, Recommendations And Conclusion

Policy Implications

The bilateral causality between agricultural growth and economic growth implies that agricultural surplus is important for the structural transformation accompanying economic growth in Nigeria. On the other hand, economic growth spurs modern mechanization of agriculture. The bi-directional relationship between agricultural growth and financing implies that agriculture financing is necessary policy instrument because the changes in land tenure and improvement/adoption of techniques that made agricultural growth possible required substantial outlays of capital. Thus, agricultural growth influence roles play by financing institutions that provide capital for economic development. The unidirectional causality from economic growth to financing is much expected because a growing economy attracts much needed finance for her development.

Economic growth in Nigeria is mainly determined by growth of openness of trade, government size, investment rate and agricultural growth. This implies that a country with greater trade openness would be expected to take advantage of increase capital inflows by accumulating capital and adopting a more capital intensive production technique in the tradable sector. This would cause an increase in labour productivity that leads to higher real wages, greater demand for nontradables and higher relative price of nontradables. This is spending effects following an increase in capital inflows, which would induce a greater real exchange rate appreciation due to a greater degree of openness. Agricultural growth attracts financing needed to bring about the desired growth rate since modern mechanization creates opportunity for specialization and commercialization in the sector. Size of government has

adequate capacity to raise domestic revenue to finance the desired level of investment. The negative and significant impact of investment implies that most investments are not bolted down i.e. are not made in physical assets in the economy and such investment can flee the economy.

The negative coefficient on domestic savings as ratio of agric real GDP supports the existence of crowding out hypothesis in Nigeria. The negative coefficient on Treasury bill as ratio of agric. RGDP, development stock as ratio of agric. RGDP and multilateral debt as ratio of agric RGDP support the existence of rigidity of debt contracts which place all risk on borrower and misallocation of the foreign assistance. The negative coefficient on Agric foreign private investment as ratio of agric. RGDP, and agric share capital as ratio of agric. RGDP support the hypothesis that the agricultural foreign private investments are not ‘bolted down’ in agricultural capital investment i.e. investments are not made in physical assets that cannot flee the economy. This implies that such investment comes in as ‘hot money’ which is procyclical capital flow. The negative coefficient also implies that such agriculture financing options are not appropriate for inducing agriculture–led economic growth.

Moreover, the positive coefficient on DS thus contradicting the existence of crowding out hypothesis in Nigeria. However, the sharp deviation may be explained by debt conversion through settlement of part of Nigeria’s debt with some proportionate amount of Crude oil and oil dominated export earnings. A notable finding is the positive coefficients on Official development assistant as ratio of agric. RGDP, and foreign direct investment as ratio of agric. RGDP which suggest that increase foreign assistant have complement effects on domestic savings. Thus, supporting the findings that foreign aid and foreign direct investment assist to close the exchange gap, provide access to modern technology and managerial skills, and allow easier access to foreign market. The positive coefficient also implies that such agriculture financing options are appropriate for inducing agriculture-led economic growth.

Recommendations

In view of empirical results of the study, it is recommended that:

Government should maintain the credibility of macroeconomic policy that will make borrowing pro-investment in order create economic growth through such investments;

Agriculture financing should be given paramount attention in policy formulation;

Nigeria should encourage more international trade because gains from the trade contribute to economic growth;

Nigeria should attract foreign investments that would be bolted down i.e. made in physical assets in the sector and not in such investment that can flee the economy;

Government presence in financing agricultural growth should be given great attention. And agricultural capital investment and agricultural import substitution policy should be pursued effectively;

Expansion of capital investment and increase in productivity of agricultural investment should be more appropriately financed with domestic savings, foreign private loan, share capital, foreign direct investment and development stocks.

Conclusion

Agriculture financing is essential in development strategies in a variety of ways. It promotes agricultural investment and adoption of technology necessary to spur economic growth. It has been shown that most African countries (Nigeria inclusive) have inadequate levels of domestic savings, which could be directed to investment and insufficient export earnings required to import capital goods for investment. For the target rate of agriculture-led economic growth to be achieved there would have to be external financing (either as foreign investment or foreign borrowing) to fill the gaps. To this end, the need to investigate impact of agriculture financing appears more imperative for economic growth in Nigeria. However, Expansion of capital investment and increase in productivity of agricultural investment should be more appropriately financed with domestic savings, foreign private loan, share capital, foreign direct investment and development stocks are among suggested recommendations for agriculture-led economic growth.

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Appendix

Dependent Variable: INEGR1

Method: Least Squares

Date: 01/17/12 Time: 05:51

Sample(adjusted): 1971 2007

Included observations: 37 after adjusting endpoints

Variable	Coefficien t	Std. Error	t-Statistic	Prob.
INODAA	0.205470	0.227500	0.903163	0.3747
INNSA	-0.057129	0.474834	-0.120315	0.9052
INTBA(1)	-0.716011	0.626313	-1.143217	0.2634
INDVSA(1)	-0.776067	0.467813	-1.658924	0.1091
INMLA(1)	-0.987940	0.550917	-1.793264	0.0846
INPLCA(1)	0.618945	0.628071	0.985470	0.3335
INAFPI(1)	-0.177911	0.521414	-0.341208	0.7357
INAC(1)	-0.486075	0.626711	-0.775597	0.4450
INFDA(1)	0.760500	0.579875	1.311489	0.2012
INDS	0.433223	0.335971	1.289467	0.2086
C	-4.400445	1.927719	-2.282722	0.0309
R-squared	0.391883	Mean dependent var	-	3.047978
Adjusted R-squared	0.157992	S.D. dependent var	1.247211	
S.E. of regression	1.144454	Akaike info criterion	3.349505	
Sum squared resid	34.05412	Schwarz criterion	3.828426	
Log likelihood	-50.96584	F-statistic	1.675493	
Durbin-Watson stat	2.273906	Prob(F-statistic)	0.140568	

ADF Test Statistic -6.729868 1% Critical Value* -4.2324

5% Critical Value -3.5386

10% Critical Value -3.2009

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(RESID01)

Method: Least Squares

Date: 01/17/12 Time: 05:54

Sample(adjusted): 1972 2007

Included observations: 36 after adjusting endpoints

Variable	Coefficien	Std. Error	t-Statistic	Prob.
	t			
RESID01(-1)	-1.146897	0.170419	-6.729868	0.0000
C	0.035464	0.352486	0.100611	0.9205
@TREND(1970)	-0.000632	0.015955	-0.039629	0.9686
R-squared	0.578836	Mean dependent var	0.022805	
Adjusted R-squared	0.553311	S.D. dependent var	1.487252	
S.E. of regression	0.994002	Akaike info criterion	2.905500	
Sum squared resid	32.60531	Schwarz criterion	3.037460	
Log likelihood	-49.29900	F-statistic	22.67714	
Durbin-Watson stat	2.012382	Prob(F-statistic)	0.000001	

Dependent Variable: INEGR1

Method: Least Squares

Date: 01/17/12 Time: 05:57

Sample(adjusted): 1971 2007

Included observations: 37 after adjusting endpoints

Variable	Coefficien t	Std. Error	t-Statistic	Prob.
INODAA	0.053683	0.224660	0.238954	0.8128
INNSA	0.267272	0.455509	0.586753	0.5618
INAFPI(1)	-0.589461	0.511413	-1.152611	0.2582
INAC(1)	-0.228250	0.625992	-0.364622	0.7180
INFDA(1)	-0.115994	0.387001	-0.299726	0.7665
INDS	0.164601	0.324579	0.507122	0.6158
C	-0.643195	1.262503	-0.509460	0.6142
R-squared	0.179479	Mean dependent var	-	3.047978
Adjusted R-squared	0.015375	S.D. dependent var	1.247211	
S.E. of regression	1.237586	Akaike info criterion	3.432861	
Sum squared resid	45.94859	Schwarz criterion	3.737629	
Log likelihood	-56.50792	F-statistic	1.093690	
Durbin-Watson stat	1.778839	Prob(F-statistic)	0.388808	

ADF Test Statistic -5.177398 1% Critical Value* -4.2324

5% Critical Value -3.5386

10% Critical Value -3.2009

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(RESID01)

Method: Least Squares

Date: 01/17/12 Time: 05:58

Sample(adjusted): 1972 2007

Included observations: 36 after adjusting endpoints

Variable	Coefficien	Std. Error	t-Statistic	Prob.
	t			
RESID01(-1)	-0.893155	0.172510	-5.177398	0.0000
C	0.048036	0.414334	0.115935	0.9084
@TREND(1970)	-0.001627	0.018753	-0.086747	0.9314
R-squared	0.448291	Mean dependent var	0.021241	
Adjusted R-squared	0.414854	S.D. dependent var	1.528014	
S.E. of regression	1.168851	Akaike info criterion	3.229575	
Sum squared resid	45.08504	Schwarz criterion	3.361535	
Log likelihood	-55.13236	F-statistic	13.40708	
Durbin-Watson stat	1.964245	Prob(F-statistic)	0.000055	

Dependent Variable: INEGR1

Method: Least Squares

Date: 01/17/12 Time: 06:07

Sample(adjusted): 1971 2007

Included observations: 37 after adjusting endpoints

Variable	Coefficien	Std. Error	t-Statistic	Prob.
	t			
INTBA(1)	-0.021112	0.435966	-0.048425	0.9617
INDVSA(1)	-0.191158	0.315879	-0.605161	0.5495
INMLA(1)	0.130229	0.342111	0.380664	0.7060
INPLCA(1)	-0.624694	0.377489	-1.654869	0.1080
INDS	0.190293	0.193057	0.985683	0.3319
C	-5.041057	1.760520	-2.863391	0.0075
R-squared	0.219273	Mean dependent var	-	3.047978
Adjusted R-squared	0.093349	S.D. dependent var	1.247211	
S.E. of regression	1.187572	Akaike info criterion	3.329093	
Sum squared resid	43.72016	Schwarz criterion	3.590323	
Log likelihood	-55.58821	F-statistic	1.741317	
Durbin-Watson stat	2.022438	Prob(F-statistic)	0.154568	

ADF Test Statistic -5.850406 1% Critical Value* -4.2324
 5% Critical Value -3.5386
 10% Critical Value -3.2009

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(RESID01)

Method: Least Squares

Date: 01/17/12 Time: 06:08

Sample(adjusted): 1972 2007

Included observations: 36 after adjusting endpoints

Variable	Coefficien t	Std. Error	t-Statistic	Prob.
RESID01(-1)	-1.016598	0.173765	-5.850406	0.0000
C	-0.119695	0.406413	-0.294516	0.7702
@TREND(1970)	0.005463	0.018393	0.296984	0.7683
R-squared	0.509521	Mean dependent var	-	0.001031
Adjusted R-squared	0.479795	S.D. dependent var	1.589441	
S.E. of regression	1.146388	Akaike info criterion	3.190764	
Sum squared resid	43.36875	Schwarz criterion	3.322724	
Log likelihood	-54.43375	F-statistic	17.14061	
Durbin-Watson stat	1.977890	Prob(F-statistic)	0.000008	

Dependent Variable: INDF(1)

Method: Least Squares

Date: 01/03/12 Time: 04:17

Sample(adjusted): 1971 2007

Included observations: 37 after adjusting endpoints

Variable	Coefficien	Std. Error	t-Statistic	Prob.
	t			
ININF(1)	0.026888	0.093864	0.286456	0.7766
INEXR(1)	0.418725	0.160485	2.609124	0.0142
INFDV(1)	0.953720	0.187316	5.091501	0.0000
INFO	-0.005271	0.019098	-0.276023	0.7845
ININR(1)	0.844652	0.283923	2.974938	0.0059
INPCI(1)	0.542375	0.122066	4.443297	0.0001
EGR1	-0.081209	0.051908	-1.564481	0.1286
C	6.461028	0.915281	7.059063	0.0000
R-squared	0.986377	Mean dependent var	12.16116	
Adjusted R-squared	0.983088	S.D. dependent var	2.704408	
S.E. of regression	0.351693	Akaike info criterion	0.936694	
Sum squared resid	3.586949	Schwarz criterion	1.285000	
Log likelihood	-9.328831	F-statistic	299.9609	
Durbin-Watson stat	1.324612	Prob(F-statistic)	0.000000	

ADF Test Statistic -3.977804 1% Critical Value* -4.2324
 5% Critical Value -3.5386
 10% Critical Value -3.2009

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(RESID02)

Method: Least Squares

Date: 01/03/12 Time: 04:21

Sample(adjusted): 1972 2007

Included observations: 36 after adjusting endpoints

Variable	Coefficien	Std. Error	t-Statistic	Prob.
	t			
RESID02(-1)	-0.680979	0.171195	-3.977804	0.0004
C	0.009663	0.110792	0.087217	0.9310
@TREND(1970)	-0.000340	0.005040	-0.067462	0.9466
R-squared	0.330562	Mean dependent var	-	0.005708
Adjusted R-squared	0.289990	S.D. dependent var	0.368400	
S.E. of regression	0.310421	Akaike info criterion	0.577883	
Sum squared resid	3.179927	Schwarz criterion	0.709843	
Log likelihood	-7.401893	F-statistic	8.147533	
Durbin-Watson stat	1.942674	Prob(F-statistic)	0.001331	

Dependent Variable: INEGR1

Method: Least Squares

Date: 01/18/12 Time: 10:28

Sample(adjusted): 1971 2007

Included observations: 37 after adjusting endpoints

Variable	Coefficien t	Std. Error	t-Statistic	Prob.
INAGR1	0.733984	0.164799	4.453821	0.0001
INGSZR(1)	0.443656	0.259617	1.708883	0.0975
ININVR(1)	-0.117147	0.070941	-1.651325	0.1088
INTOR	0.246397	0.201773	1.221160	0.2312
INDFR	-0.113267	0.129420	-0.875188	0.3882
C	0.154303	0.810446	0.190392	0.8502
R-squared	0.550012	Mean dependent var	-	3.047978
Adjusted R-squared	0.477433	S.D. dependent var	1.247211	
S.E. of regression	0.901594	Akaike info criterion	2.778088	
Sum squared resid	25.19900	Schwarz criterion	3.039318	
Log likelihood	-45.39463	F-statistic	7.578150	
Durbin-Watson stat	2.073264	Prob(F-statistic)	0.000095	

ADF Test Statistic -6.008253 1% Critical Value* -4.2324
 5% Critical Value -3.5386
 10% Critical Value -3.2009

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(RESID03)

Method: Least Squares

Date: 01/18/12 Time: 10:29

Sample(adjusted): 1972 2007

Included observations: 36 after adjusting endpoints

Variable	Coefficien t	Std. Error	t-Statistic	Prob.
RESID03(-1)	-1.054508	0.175510	-6.008253	0.0000
C	-0.017931	0.308079	-0.058202	0.9539
@TREND(1970)	0.000351	0.013947	0.025179	0.9801
R-squared	0.522530	Mean dependent var	-	0.034640
Adjusted R-squared	0.493593	S.D. dependent var	1.221252	
S.E. of regression	0.869071	Akaike info criterion	2.636871	
Sum squared resid	24.92439	Schwarz criterion	2.768831	
Log likelihood	-44.46368	F-statistic	18.05717	
Durbin-Watson stat	1.924664	Prob(F-statistic)	0.000005	

Dependent Variable: INDF

Method: Least Squares

Date: 01/17/12 Time: 08:07

Sample(adjusted): 1971 2007

Included observations: 37 after adjusting endpoints

Variable	Coefficien t	Std. Error	t-Statistic	Prob.
ININF(1)	0.042170	0.100085	0.421347	0.6767
INEXR(1)	0.488117	0.169106	2.886463	0.0074
INFDV(1)	0.983449	0.200883	4.895622	0.0000
INFO	-0.023730	0.020132	-1.178708	0.2484
ININR(1)	0.496458	0.309782	1.602604	0.1202
INPCI(1)	0.532445	0.128423	4.146007	0.0003
EGR1EST	-0.229431	0.085387	-2.686954	0.0120
RESEGR	0.226936	0.115119	1.971311	0.0586
C	4.900685	1.079875	4.538196	0.0001
R-squared	0.985808	Mean dependent var	11.93494	
Adjusted R-squared	0.981753	S.D. dependent var	2.734305	
S.E. of regression	0.369353	Akaike info criterion	1.053645	
Sum squared resid	3.819806	Schwarz criterion	1.445490	
Log likelihood	-10.49243	F-statistic	243.1172	
Durbin-Watson stat	1.429498	Prob(F-statistic)	0.000000	

ADF Test Statistic -4.224151 1% Critical Value* -4.2324
 5% Critical Value -3.5386
 10% Critical Value -3.2009

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(RESID01)

Method: Least Squares

Date: 01/17/12 Time: 08:08

Sample(adjusted): 1972 2007

Included observations: 36 after adjusting endpoints

Variable	Coefficien	Std. Error	t-Statistic	Prob.
	t			
RESID01(-1)	-0.730490	0.172932	-4.224151	0.0002
C	-0.006858	0.116521	-0.058853	0.9534
@TREND(1970)	0.000422	0.005296	0.079674	0.9370
R-squared	0.354412	Mean dependent var	-	0.007032
Adjusted R-squared	0.315286	S.D. dependent var	0.394919	
S.E. of regression	0.326785	Akaike info criterion	0.680627	
Sum squared resid	3.524020	Schwarz criterion	0.812587	
Log likelihood	-9.251289	F-statistic	9.058109	
Durbin-Watson stat	1.922419	Prob(F-statistic)	0.000732	