Public Expenditure And Economic Growth In Nigeria

Author

Usman, A ; Mobolaji, H. I; Kilishi, A. A.; Yaru, M. A.; And Yakubu, T. A.

Department of Economics, University of Ilorin, Ilorin, Nigeria.

E-mail:abdullateefusman@gmail.com

Abstract

The debate on the use of fiscal policy for economic stabilization and inducement of economic growth is an old one. Key issue in this debate relates to the efficacy of public expenditure on stimulating economic growth. The neo-classical school held on extreme position by refuting the usage of fiscal policy to regulate the economy even in the time of economic crisis. At the other extreme are those who emphasize the efficiency of fiscal policy in stabilizing economic fluctuations and stimulating growth. There is nearly a consensus on the short-run effects of fiscal policy on the economy. Fiscal policy can temporarily raise or lower national income or counteract macroeconomic disturbances that would otherwise influence national output. This paper contributes to this debate by investigating the effect of federal government expenditure on economic growth in Nigeria.

An augmented Solow model is specified in Cobb-Douglas form with public capital as one of the factors. Public expenditure is used as proxy for public capital which is further decomposed by sectors. This helps us to investigate the impact of each sector on economic growth. The decomposition is in three expenditure streams: (i) expenditure on building human capital- public expenditure on education and health; (ii) expenditure on building infrastructure- public expenditure on transport and communication, and other social services; and (iii) expenditure on administration which is necessary for the functioning of government;

A multivariate time series framework is used. Augmented Dickey- Fuller test indicated that two of the variables are stationary at first difference while other variables are stationary at levels. While Phillips Peron tests show that three are stationary at levels and others at first difference. Results of the regressions show that in the short run public spending has no impact on growth. However, Cointegration and VEC results show that there is long run relationship between public expenditure and growth.

Introduction

In almost all economies today government intervenes in undertaking fundamental roles of allocation, stabilization, distribution and regulation especially where or when market proves inefficient or its outcome is socially unacceptable. And also governments particularly in developing economies intervene to achieve macroeconomic objectives such as economic growth and development, full employment, price stability and poverty reduction. Theoretically, both Keynesians and neoclassical economists provided varieties of policies and tools of government intervention, which are broadly grouped into fiscal and monetary. The choice of a policy or tool depends on how relatively effective it is, in achieving the set of macroeconomic objectives based on theory or evidence. Thus, it is important to carry out country specific study so as to identify the efficacies of different policy instruments. This study focuses on expenditure aspect of fiscal policy. Public expenditure has over time become the key instrument by which governments seek to promote economic growth and development especially in developing countries like Nigeria.

However, there is no consensus in the theoretical literature on the impact of public expenditure on growth (Paternostro et al, 2007). And empirically,

there are plethora of studies on the relationship between public expenditure and economic growth. While Studies like Easterly and Rebelo (1993), Singh R.J and Weber, R (1997); Bose, N et al (2007), Haque and Kim (2003), Sutherland et al (2009), Semmler et al (2007), Aschaeur (1989), Motmmell (1990) and Delorme et al (1999) found significant positive growth effects of public expenditure, Others especially on the rich countries indicated that large government size is detrimental to economic growth (Schaltegger and Torgler (2006) and Abu- Badaer and Abu Quarn (2003).

Thus, the grounds for allocating public expenditure to areas that are most likely to contribute to growth need to be clearly established empirically. Unfortunately, most of the available studies are cross- country studies. This study is a country specific study that focus on Nigeria, where there is growing contest over "Fiscal Space" by various sectors, regions and different arms of government.

The main objective of this study is to examine and analyze the impacts of the composition of public expenditure on economic growth in Nigeria. Specifically, the study explores the relative impacts of different components of public expenditure on economic growth. Resulting from this, the study provides a guide for allocation of public resources to stimulate higher growth. The study presents Nigeria's case by examining the effects of public expenditure composition on economic growth.

The data used in the study covered the period between 1970 to 2008. The sources of the data include; Central Bank of Nigeria Statistical Bulletin and National Bureau of Statistics. The remainder of the paper is organised into four sections. Following this introduction is section two which presents the review of empirical literature, section three presents the theoretical framework and methodology. Section four focuses on the results and analysis of the estimated models. Section five presents the conclusion.

Review of Empirical Literature on Public Expenditure and Growth

Several studies had been undertaken on the relationship between public expenditure and economic growth. According to Romp and De Haan (2005), the techniques adopted by the empirical studies can be grouped into: the production function approach, which is the most commonly used, the cost function approach, which exploits the dual properties of cost and production functions, vector autoregressive (VAR) studies, cross-country, or regional cross-section growth regressions and structural econometric models with public investment (see also Sturm (1998) on this issue). But the findings are generally mixed.

Some of the recent empirical studies include Bose, et al (2007) which examined the growth effect of public expenditure by sectors using data for a panel of 30 developing countries covering the period of 1970-1990. The finding shows that, public capital expenditure is positively correlated with economic growth, while the growth effects of current expenditure is insignificant for the group of countries. Meanwhile, at sectoral level, government expenditure on education is the only outlay that remains significant throughout the analysis. While the growth effect of transport and communication, defence initially had significant impact but could not survive when other sectors and budget constraints were incorporated into the analysis.

Devarajan et al (1996) studied the effects of different expenditure component on growth. The study covered 43 countries for periods of 1970 to 1990. The study shows that current expenditure has positive impact on growth, while capital expenditure exerts negative impact on growth. But when a subsample of developed countries were considered the result was reversed indicating that, the earlier result might be as a result of corruption and inefficiency in the use of public funds in the developing countries.

Haque and Kim (2003) examined the impacts of public investment on economic growth of 15 developing countries using dynamic panel data techniques. The findings indicated that public investment in transportation has dynamic effects on economic growth. Sutherland et al (2009) also examined the effects of infrastructure on economic growth by running a cross country growth regression. The study confirmed that investment in public infrastructure, especially in form of telecommunications and energy generation have a strong and significant effect on economic growth. Similarly, Romp and De Haan (2005) following a survey of the recent empirical literature on the subject found that, with respect to the earlier contributions, there is more agreement about the positive effect of public capital on growth.

Semmler et al (2007) investigated whether a country could use fiscal policy (and in particular, the level and composition of public expenditure) to promote sustainable growth and welfare in low- and middle –income countries. The study covered 35 countries and a model was developed following the production function approach. The model was calibrated. The study found that composition of public investment expenditure matters, as the gains of moving to optimal allocation between public infrastructure, and education and health facilities

are significant. Based on the model and the calibration exercise, a practical rule of thumb suggests that about two-third of public investment should be directed towards public infrastructure that facilitates market production. The paper also noted that greater emphasis on education and health relative to investments that may contribute to expansion of market production may result to slower growth/progress in reducing poverty.

Singh and Weber (1997) delves into the link between public expenditure and economic growth in Switzerland by regressing growth on public expenditure on six functional categories (Education, health, social welfare, transport, justice and national defence) using the data for 1950-1994. The authors used time series models and OLS estimation method and found that fiscal spending can influence long run growth. However, out of the six expenditure categories only two (Education and Health) had been found to have permanent growth effects. The effect of education was positive while that of health was negative.

Ghani, and Din, (2006) explored the role of public investments in the process of economic growth. The model consists of four variables; public investment, private investment, public consumption and GDP for the period of 1973- 2004 for Pakistan. Time series and VAR modelling approach was used for the study and it was found that growth is largely driven by private investment than public investment. And that public investment crowds out private investment.

Schaltegger and Torgler (2006) examined the growth effect of public expenditure at the state and local levels in Switzerland having identified that most of the previous studies concentrated on aggregate public expenditure. The study covered the period of 1981 and 2001. The finding of the study shows that public expenditure at both level have negative impacts on growth as found by the previous studies at aggregate levels. Abu-Badaer and Abu-Qarn (2003) investigated the causal link between government expenditures and economic growth for Egypt, Israel and Syria. The study found bidirectional causality from government spending to economic growth but with a negative long term relationship between the two variables. At the sectoral level, it was also found that Military burden negatively affects economic growth for all the three countries and that civilian expenditure had a positive growth effects in Egypt and Israel.

Badawi (2003) found that the impact of private investments on real growth in Sudan has been more pronounced compared to that of public investment. While the crowding-out effect of public investment on private investment was found to be highly significant. Similar evidence was found in Pakistan by Ghani and Din, (2006) using a VAR model. Contrary, to Badawi (2003), Ghani and Din, (2006), Blanchard and Perotti (2002) and, Schaltegger and Torgler (2006) found that both private and public expenditure have insignificant impacts on growth.

Recent studies in Nigeria include Maku (2009), Nurudeen and Usman (2010) and Akpan (2005). The resulting findings are equally mixed. Nurudeen and Usman (2010) for instance, show that government total recurrent and capital expenditure had insignificant growth effects and the impact of expenditure on education was negative. Only expenditure on transport and communication, and health had positive effects on growth in their findings. This is partly in consonance to Fajingbensi and Odusola (1999) which found the contribution of recurrent expenditure to growth as insignificant. The findings of Akpan (2005) also indicated growth effects of the different components of government expenditure to be weak. This may be as a result of the prevailing corruption in the country as noted by Haque and Kneller (2008) that corruption increases public investment and reduces the returns to public investment, eventually, making it ineffective in promoting growth.

In spite of the diversity of the reviewed empirical studies in terms of methodologies, coverage and level of countries developments, almost a common conclusion has been apparent. Public expenditure on education, transportation, infrastructure and telecommunication has persistently appeared to have had significant growth effects in both the developed and developing countries. These studies include Easterly and Rebelo (1993), Singh R.J and Weber, R (1997); Bose, N et al (2007), Haque and Kim (2003), Sutherland et al (2009) and Semmler et al (2007), Other earlier studies with similar conclusion in the U. S include Aschaeur (1989), Motmmell (1990) and Delorme et al (1999).

However, the impacts of capital and recurrent expenditure on growth have been somehow mixed and inconclusive. While majority of the studies especially on the rich countries indicated that large government size is detrimental to economic growth (Schaltegger and Torgler , 2006 and Abu- Badaer and Abu Quarn (2003). From the review above, empirical evidence on the impacts of public expenditure on economic growth for Nigeria are scanty. This study therefore, not only contributes to the debate on the use fiscal policy to influence growth but also provide further empirical evidence on the impacts of public expenditure on growth in Nigeria.

Theoretical Framework and Methodology

In the neoclassical growth theories (from Solow 1956 to Koopmans 1965) government expenditures have no impact on economic growth. Romer (1986) constructed endogenous growth model which captured the impact of government decisions. However, his results show that government actions were detrimental or neutral to long run economic growth. Barro (1990) in his path breaking paper, allowed for productive public sector spending. He identified the existence of a positive correlation between government spending and long run economic growth. Davoodi and Zou (1998) followed Barro (1990) by specifying a growth model which consists of a production with two kinds of inputs: private capital and public spending.

In this paper we specified an augmented Solow model where the production function of economy is given;

$$Y_t = (AK_tL_tG_t) \text{.....(1)}$$

Expressing (1) in per capital form, by dividing through by L_t gives;

$$y_t = (Ak_tg_t) \text{.....(2)}$$

$$y_t = Ak_t^{\alpha} g_t^{\beta};\ \alpha + \beta = 1 \text{.....(3)}$$

Where y_t is per capital output at time t, K_t is per capita private capital at time t and g_t per capita public capital at time t respectively.

Taking the log of equation (3) yield a linear function expressed in (4)

$$Iny_t = InA + \alpha InK_t + \beta Ing_t \text{.....(4)}$$

Differentially (4) with respect to time (t) gives the growth rates of the variables. Hence equation (4) becomes;

$$GRy = \alpha GRk + \beta GRg \text{.....(5)}$$

Model Specification and Estimation Techniques

Following from equation (5) the empirical model for this study can be written as:

$$GRy = \alpha GR(Dk + Fk) + \beta GR(gPE + gPI + gPA)$$
..... (6)

Where, $(Dk + Fk = k)$ and $(gPE + gPI + gPA) = g$

Thus;

$$GRy = \alpha_1 GRDk + \alpha_2 GRFk + \beta_1 GRPE + \beta_2 GRPH + \beta_3 GRPI + \beta_4 GRPA$$
.....(7)

Definition of variables;
GRy = Growth rate of Output (GDP)
$GRDk$ = Growth rate of Domestic Capital
$GRFk$ = Growth rate of Foreign Capital inflow
$GRPE$ = Growth rate of Public Expenditure on Education
$GRPH$ = Growth rate of Public Expenditure on Health
$GRPI$ = Growth rate of Public Expenditure on Infrastructure
$GRPA$ = Growth rate of Public Expenditure on Administration

The study makes use of VAR to estimate the empirical model. Thus, the equations to be estimated are extension of equation (7) to a VAR model. This can be expressed in vector form as:

$$\begin{pmatrix} \Delta GRy_t \\ \Delta GRDk_t \\ \Delta GRFk_t \\ \Delta GRPE_t \\ \Delta GRPH_t \\ \Delta GRPI_t \\ \Delta GRPA_t \end{pmatrix} = \begin{pmatrix} S_{11}(L)S_{12}(L)S_{13}(L)S_{14}(L)S_{15}(L)S_{16}(L)S_{17}(L) \\ S_{21}(L)S_{22}(L)S_{23}(L)S_{24}(L)S_{25}(L)S_{26}(L)S_{27}(L) \\ S_{31}(L)S_{32}(L)S_{33}(L)S_{34}(L)S_{35}(L)S_{36}(L)S_{37}(L) \\ S_{41}(L)S_{42}(L)S_{43}(L)S_{44}(L)S_{45}(L)S_{46}(L)S_{47}(L) \\ S_{51}(L)S_{52}(L)S_{53}(L)S_{54}(L)S_{55}(L)S_{56}(L)S_{57}(L) \\ S_{61}(L)S_{62}(L)S_{63}(L)S_{64}(L)S_{65}(L)S_{66}(L)S_{67}(L) \\ S_{71}(L)S_{72}(L)S_{73}(L)S_{74}(L)S_{75}(L)S_{76}(L)S_{77}(L) \end{pmatrix} \begin{pmatrix} GRy_t \\ GRDk_t \\ GRFk_t \\ GRPE_t \\ GRPH_t \\ GRPI_t \\ GRPA_t \end{pmatrix} + \begin{pmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \\ \varepsilon_{4t} \\ \varepsilon_{5t} \\ \varepsilon_{6t} \\ \varepsilon_{7t} \end{pmatrix} \text{..... (8)}$$

Where S_{ij}coefficients of exogenous variables in each equation and (L) are is the lag operators and ε_{it} is the vector of the uncorrelated white noise disturbances.

Discussion of Results

The analysis involves multi-stage procedure. The study starts with the estimation of the models using OLS. We converted all the series to growth rate and undertook OLS estimation which are reported in Table 3 and 4. We run OLS with the first differences of the series. Table 3 is the result of OLS with White-heteroskedasticity Consistent Standard Errors and Covariance, while Table 4 is OLS result with Newey-west HAC Errors and Covariance. The results of the two regressions show that all the variables are statistically significant except expenditure on general administration in the former. However, expenditure on education administration and, transport and communication have negative signs. This is counter intuitive. Though, FDI, expenditure on health and other services exert positive impact on real GDP. We applied another approach by defining human capital as summation of expenditure education and health, and infrastructure as summation of expenditure on other services and, transport and communication. The results are reported in Table 5 and 6 respectively. In the two results all variables have positive signs but not statistically significant. The critical problem common to all the OLS results is that the R^2 is too low and the F statistics are not significant.

We proceeded to test for stationarity of the series. We used Augmented Dickey-Fuller (ADF) unit root test, Phillips- Peron (PP) test and Elliott-Rothenberg Stock DF-GLS test. However, only ADF and PP tests are reported in Table 1 and 2 below. The ADF results show that expenditure on education and real GDP are stationary at first difference while all the remaining variables are stationary at levels. The PP results however show that expenditures on health, general administration and infrastructures are stationary at levels while the remaining variables are stationary at first difference. The Elliott-Rothenberg-Stock DF-GLS is not consistent with the results of ADF and PP results. This is the reason why Elliott-Rothenberg-Stock DF-GLS is not reported.

We went further to examine the long –run relationship between the explanatory variables and economic growth. We conducted Johansen Cointegration test to establish a long run relationship between the variables and economic growth. Both the trace test and max-eigenvalue test indicated that there are at least three cointegrating vectors or relationship. We can hence conclude that the variables (public expenditure) have long run impact on economic growth in Nigeria. The results are reported in Table 7. This take us to the next step, that is to confirm which of the variables actually has the long run impact and which does not. Thus, we impose restrictions on both the alpha and beta of each variable to assess the long run impact as well as importance of each variable in the vector. We estimates the Vector Error Correction Model. The results are reported in Table 8. The result shows evidence of long run equilibrium. However, this result cannot be trusted because all the variables including the error correction term are not significant. Hence, there is no evidence that public expenditures matter for economic growth in Nigeria.

Concluding Remark

The results of the OLSs show that expenditure on administration, education, and transport and communication have negative impact on economic growth in the short run. On the other hand expenditure on health and other services, and FDI have positive impact on growth. Education and health are sum up as human capital, while other services and transport and communication are aggregated as infrastructure. Regressions were run with human capital and infrastructure as explanatory variables. The results show that all the variables have positive impact on economic growth. Although, not statistically significant.

However, the cointegration tests show that there is long run relationship between public expenditure and economic growth. This made us to consider vector error correction model which also confirmed the existence of long run equilibrium.

Thus, we conclude that public expenditure on administration, education and transport and communication does not matter for economic growth in Nigeria. This is could be as result of missing expenditure between release and execution of projects. It is important that strong monitoring of project execution be emphasized. Foreign Direct Investment FDI is important for economic growth both in the short and long run. Policies that attract FDI inflows should be encouraged.

References

Abu-bader, S. and A. Abu-Qarn (2003) "Government Expenditures, Military Spending and Economic Growth: Causality Evidence from Egypt, Israel and Syria". MPRA paper No. 1115. http://mpra.ub.uni-muenchen.de/1115/

Abu N, and Abdullahi U (2010) "Government Expenditure and Economic Growth in Nigeria, 1970-2008: ADisaggregated Analysis"**Business and Economics Journal**, Vol. 4

Akpan N.I (2005) "Government Expenditure and Economic Growth in Nigeria: A disaggregated Approach", CBN Financial and Economic Review, Vol. 43 No. 1

Aschauer, D. (1989) "Does Public Capital Crowd out Private Capital?", Journal of Monetary Economics, Vol. 24, No.2, pp. 171-188.

Badawi, A. A. (2003) "Private Capital Formation and Public Investment in Sudan: Testing the Substitutability and Complementarities Hypotheses in a Growth Framework", Journal of International Development, Vol.15, No. 6,pp.783-799.

Baro, R (1990) "Government Spending in Simple Model of Endogenous Growth", Journal of Political Economy, Vol. 98, No.5, pp103-126.

Blanchard, O. and R. Perotti (2002) "An Empirical Characterization of the Dynamic Effects of Changes in Government Spending and Taxes on Output", The quarterly Journal of Economics, Vol.117, pp.1329-1368.

Charles D. Delome Jr., Herbert G, Thompson Jr., Ronald S.W (1999) "Public Infrastructure and Private Productivity: A stochastic Frontiers Approach"**Journal of Macroeconomics**, Vol. 21 issue 3 pp563-576.

Deverajan, S., Swaroop V, and H. Zou, (1996) "The Composition of Public Expenditure and Economic Growth", Journal of Monetary Economics, Vol. 37, No....., pp. 313-344.

Easterly W. And Rebelo S (1993) "Fiscal Policy and Economic Growth : An Empirical Investigation", Journal of Monetary Economics, Vol. 32, No.3, pp. 417-458.

Fajingbesi, A. A and Odusola, A.F (1999) "Public Expenditure and Growth". A Paper Presented at a Training Programme on Fiscal Policy planning Management in Nigeria, organized by NCEMA, Ibadan. 137-179

Ghani, E and M. Din, (2006) "The Impact of Public Expenditure on Economic Growth in Pakistan", Pakistan Development Review Vol. 45, No.1, 87-98.

Haque M and D. Kim (2003) "Public Investment in Transportation and Communication and Growth: A Dynamic Panel Approach", The School of Economics Discussion Paper Series, 0324, The University of Manchester.

Haque M and R. Kneller (2008) "Public Investment and Growth: The Role of Corruption", Centre for Growth and Business Cycle Research Discussion Paper Series No. 98,

Koopmans, T. (1965) "On the Concept of Optimal Economic Growth" In the Econometric Approach to Development Planning, Amsterdam: North Holland.

Maku, O. E (2009) "Does Government Spur Economic Growth in Nigeria?" MPRA Paper No.17941. http://mpra.ub.uni-muenchen.de/17941/

Niloy B, Memranul H, and Denise R.O (2003) "Public Expenditure and Economic Growth: A Disaggregated Analysis for Developing Countries" Manchester School, Vol. 75, No.5,pp.533-556.

Paternostro, S. et al (2007) "How Does the Composition of Public Spending Matter?", Oxford Development Studies, Vol. 35, No.1, pp.47- 82

Romer, P. (1990) "Endogenous Technical Change", Journal of Political Economy, Vol.98, No.5,pp.71-102.

Romp, W and J. De Haan (2007) "Public Capital and Economic Growth: A Critical Survey", Perspektiven der wirtschaftspolitik, Vol. 8, No.... pp.6-52

Schaltegger, A .C. and B. Torgler (2006) "Growth Effects of Public Expenditure on State and Local Level: Evidence from a Sample of Rich Governments", Applied Economics Vol. 38, No. 10, pp.1181-1192

Semmler, W. et al (2007) "Fiscal Policy, Public Expenditure Composition, and Growth", World Bank Research Working Paper, No. 4405

Singh, J. R and R. Weber, (1997) "The Composition of Public Expenditure and Economic Growth: Can Anything be Learned from Swiss Data?", Swiss Journal of Economics and Statistics, Vol. 133, No.3,pp. 617- 634.

Solow, R. (1956) "A Contribution to the Theory of Economic Growth", Quarterly Journal of Economics, Vol. 70, pp.65-94

Sturm, J. E. (1998) Public Capital Expenditure in OECD Countries: The Causes and Impact of the Decline in Public Capital Spending, Aldershot and Lyme NH: Edward Elgar

Sutherland, D. BalázsÉgertTomasz J. KozlukSonia Araujo (2009) "Infrastructure

Investment: Links to Growth and the Role of Public Policies", OECD Economics Department Working Paper No. 686.

Appendix

Table1 : Augmented Dickey – Fuller Unit Root Test

Variable	ADF statistics	Critical Value (5%)	Order of Integration
Education	3.1588	-2.9678	I(1)
Health	-5.4078	-2.9678	I(0)
Administration	4.3152	-2.9678	I(0)
Transport & communication	4.6059	-2.9678	I(0)
Other Services	7.7308	-2.9678	I(0)
FDI	11.0023	-2.9640	I(0)
RDGP	-5.3952	-2.9434	I(1)

Source: Computed by Authors

Table 2: Phillips – Peron Test

Variable	Phillips-Peron	Critical Value 5%	Order of Integration
Education	-5.5515	-2.9434	I(1)
Health	11.7994	-2.9411	I(0)
Administration	4.4361	-2.9411	I(0)
Transport & communication	-3.6710	-2.9434	I(1)
Other Services	-4.7934	-2.9434	I(1)
FDI	-4.8776	-2.9411	I(0)
RDGP	-5.3931	-2.9434	I(1)

Source: Computed by Authors

Table 3: OLS Result 1
Dependent Variable: DRGDP
Method: Least Squares
(White Heteroskedasticity-Consistent Standard Errors & Covariance)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	11463.06	6452.210	1.776610	0.0854
DADM	-0.244268	0.149435	-1.634609	0.1122
DEDU	-1.359556	0.257118	-5.287664	0.0000
DFDI	6.32E-05	2.24E-05	2.823395	0.0082
DHEALTH	5.513415	1.072175	5.142272	0.0000
DOS	1.128037	0.196983	5.726569	0.0000
DTRC	-1.486804	0.388484	-3.827195	0.0006
R-squared	0.170548	Mean dependent var		17649.21
Adjusted R-squared	0.010009	S.D. dependent var		31634.62
S.E. of regression	31475.91	Akaike info criterion		23.71665
Sum squared resid	3.07E+10	Schwarz criterion		24.01832
Log likelihood	-443.6164	Hannan-Quinn criter.		23.82398
F-statistic	1.062344	Durbin-Watson stat		2.170905
Prob(F-statistic)	0.405805			

Sample (adjusted): 1971 2008
Included observations: 38 after adjustments

Table 4: OLS Result 2

Dependent Variable: DRGDP
Method: Least Squares
(Newey-West HAC Standard Errors & Covariance (lag truncation=3))

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	11463.06	5061.065	2.264950	0.0307
DADM	-0.244268	0.112775	-2.165978	0.0381
DEDU	-1.359556	0.223380	-6.086302	0.0000
DFDI	6.32E-05	1.58E-05	4.008877	0.0004
DHEALTH	5.513415	1.069110	5.157012	0.0000
DOS	1.128037	0.169965	6.636890	0.0000
DTRC	-1.486804	0.300643	-4.945414	0.0000
R-squared	0.170548	Mean dependent var		17649.21
Adjusted R-squared	0.010009	S.D. dependent var		31634.62
S.E. of regression	31475.91	Akaike info criterion		23.71665
Sum squared resid	3.07E+10	Schwarz criterion		24.01832
Log likelihood	-443.6164	Hannan-Quinn criter.		23.82398
F-statistic	1.062344	Durbin-Watson stat		2.170905
Prob(F-statistic)	0.405805			

Sample (adjusted): 1971 2008
Included observations: 38 after adjustments

Table 5: OLS Result 3

Dependent Variable: DRGDP
Method: Least Squares
(White Heteroskedasticity-Consistent Standard Errors & Covariance)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	12506.76	6190.087	2.020450	0.0515
DADM	0.438780	0.168154	2.609388	0.0135
DFDI	8.29E-05	2.69E-05	3.075728	0.0042
DHC	0.044717	0.236242	0.189283	0.8510
DINFR	0.058943	0.141357	0.416981	0.6794
R-squared	0.102456	Mean dependent var		17649.21
Adjusted R-squared	-0.006337	S.D. dependent var		31634.62
S.E. of regression	31734.69	Akaike info criterion		23.69029
Sum squared resid	3.32E+10	Schwarz criterion		23.90576
Log likelihood	-445.1155	Hannan-Quinn criter.		23.76695
F-statistic	0.941754	Durbin-Watson stat		2.089021
Prob(F-statistic)	0.452121			

Sample (adjusted): 1971 2008
Included observations: 38 after adjustments

Table 6: OLS Result 4
Dependent Variable: DRGDP
Method: Least Squares
(Newey-West HAC Standard Errors & Covariance (lag truncation=3))

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	12506.76	4978.093	2.512360	0.0171
DADM	0.438780	0.169486	2.588886	0.0142
DFDI	8.29E-05	2.48E-05	3.342480	0.0021
DHC	0.044717	0.114251	0.391389	0.6980
DINFR	0.058943	0.093202	0.632420	0.5315
R-squared	0.102456	Mean dependent var		17649.21
Adjusted R-squared	-0.006337	S.D. dependent var		31634.62
S.E. of regression	31734.69	Akaike info criterion		23.69029
Sum squared resid	3.32E+10	Schwarz criterion		23.90576
Log likelihood	-445.1155	Hannan-Quinn criter.		23.76695
F-statistic	0.941754	Durbin-Watson stat		2.089021
Prob(F-statistic)	0.452121			

Sample (adjusted): 1971 2008
Included observations: 38 after adjustments

Table 7: Result of Cointegration Test
Series: DRGDP DADM DINFR DHC DFDI
Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value
None *	0.862200	134.7000	69.81889
At most 1 *	0.563061	63.34987	47.85613
At most 2 *	0.446562	33.54323	29.79707
At most 3	0.265658	12.24544	15.49471
At most 4	0.030884	1.129346	3.841466

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value
None *	0.862200	71.35017	33.87687
At most 1 *	0.563061	29.80664	27.58434
At most 2 *	0.446562	21.29779	21.13162
At most 3	0.265658	11.11610	14.26460
At most 4	0.030884	1.129346	3.841466

Max-eigenvalue test indicates 3 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

Table 8: Vector Error Correction Estimates

Error Correction:	D(DRGDP)	D(DADM)	D(DINFR)	D(DHC)	D(DFDI)
CointEq1	-2569.142	1211.402	9107.015	1873.963	25600113
	(7534.20)	(2375.30)	(1195.62)	(1977.30)	(8121890)
	[-0.34100]	[0.51000]	[7.61696]	[0.94774]	[3.15199]
D(DRGDP(-1))	-0.617273	-0.004873	-0.004180	-0.007346	0.456770
	(0.19786)	(0.06238)	(0.03140)	(0.05193)	(213.298)
	[-3.11968]	[-0.07811]	[-0.13313]	[-0.14147]	[0.00214]
D(DRGDP(-2))	-0.337696	-0.019404	-0.014291	-0.021635	63.24027
	(0.19696)	(0.06210)	(0.03126)	(0.05169)	(212.325)
	[-1.71453]	[-0.31248]	[-0.45722]	[-0.41855]	[0.29785]
D(DADM(-1))	0.302057	-0.616694	-0.758108	-1.050577	9033.037
	(1.65943)	(0.52317)	(0.26334)	(0.43551)	(1788.88)
	[0.18202]	[-1.17877]	[-2.87881]	[-2.41231]	[5.04956]
D(DADM(-2))	-0.785016	-0.827056	0.750810	1.057053	-1964.750
	(2.30275)	(0.72599)	(0.36543)	(0.60434)	(2482.38)
	[-0.34090]	[-1.13921]	[2.05459]	[1.74910]	[-0.79148]
D(DINFR(-1))	0.093342	-2.928541	-1.148246	3.331018	-14441.13
	(6.28509)	(1.98150)	(0.99740)	(1.64948)	(6775.35)
	[0.01485]	[-1.47794]	[-1.15124]	[2.01944]	[-2.13142]
D(DINFR(-2))	3.936767	1.123009	-4.135642	-2.978794	5874.566
	(5.09344)	(1.60581)	(0.80829)	(1.33674)	(5490.74)
	[0.77291]	[0.69934]	[-5.11652]	[-2.22841]	[1.06990]
D(DHC(-1))	-0.327623	-1.092310	0.007696	-0.109820	-12140.28
	(2.76337)	(0.87121)	(0.43853)	(0.72523)	(2978.92)
	[-0.11856]	[-1.25379]	[0.01755]	[-0.15143]	[-4.07540]
D(DHC(-2))	1.248834	-0.439415	-2.012589	-3.264649	8466.994
	(3.98101)	(1.25509)	(0.63176)	(1.04479)	(4291.54)
	[0.31370]	[-0.35011]	[-3.18570]	[-3.12470]	[1.97295]
D(DFDI(-1))	-0.000233	-8.82E-05	0.000481	0.000124	1.252649
	(0.00046)	(0.00014)	(7.3E-05)	(0.00012)	(0.49338)
	[-0.50958]	[-0.61129]	[6.62414]	[1.03556]	[2.53891]
D(DFDI(-2))	-0.000139	-0.000108	0.000291	0.000214	-0.240913
	(0.00035)	(0.00011)	(5.6E-05)	(9.3E-05)	(0.38096)
	[-0.39337]	[-0.97148]	[5.19541]	[2.31139]	[-0.63239]
C	2235.199	4708.843	4213.481	3604.028	-4614618.
	(7685.24)	(2422.92)	(1219.59)	(2016.94)	(8284715)
	[0.29084]	[1.94346]	[3.45482]	[1.78688]	[-0.55700]
R-squared	0.318406	0.951922	0.944750	0.835647	0.982157
Adj. R-squared	-0.007574	0.928928	0.918327	0.757043	0.973623
F-statistic	0.976766	41.39896	35.75385	10.63112	115.0900
Akaike AIC	24.50901	22.20035	20.82744	21.83356	38.47474
S.D. dependent	44305.41	52593.02	24695.19	23679.08	2.95E+08