FINANCIAL AND REAL SECTOR INTERACTIONS IN DEVELOPING ECONOMIES: THE CASE OF NIGERIA

BY

BABATUNDE ISRAEL EKUNDAYO

DEPARTMENT OF ECONOMICS,

FACULTY OF THE SOCIAL SCIENCES,

UNIVERSITY OF IBADAN,

IBADAN, NIGERIA.

E-mail: babsekundayo@gmail.com

Phone: +2348038128723, +2348078730522

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ABSTRACT

In every economy, there is a need to understand the complex interactions between the financial and real sectors of the economy. Among other reasons is that a proper understanding of the relationship promotes better regulation and supervision of the financial sector which, in turn, can facilitate economic development. However, the empirical evidence regarding the relationship between financial development and economic growth remains inconclusive when applied to both developed and developing countries. This study contributes to the economic study of this interaction in developing countries. Specifically, the study analyzes the interaction between the financial and real sectors by using Nigeria as a case study. The relationship is explored using the time series techniques of granger causality, co-integration and vector error correction model (VECM) on Nigerian data from 1970-2010. The study adopts variables that indicate the depth and efficiency of the financial system as proxies for financial development, and variables describing real sector growth as proxies for the real sector. The study finds that there are interactions between the financial and real sector variables. Moreover, the study argues that measures to check excesses and lapses, which in turn inhibit proper development of the economy in the financial sector, should be put in place. Furthermore, a framework that will enable proper integration of the two sectors should be developed and implemented.

***Keywords**: Financial Sector, Real Sector, Time Series, Nigeria*

JEL Classification: C32, E60

1. INTRODUCTION

In every economy, there is need to understand the complex interactions between the financial and real sectors of the economy. A proper understanding of this relationship promotes better regulation and supervision of the financial sector which, in turn can facilitate economic development. Another reason stems from the fact that healthy financial sector is perceived to be a catalyst for sustainable economic development which, every nation desires.

This paper tries to contribute to the economic study of the interaction between the financial and real sectors in developing countries. Specifically, the paper analyses the interaction between the financial and real sector, using Nigeria as a case study. The study contributes to the existing literature by adopting a number of financial and economic variables for the case of Nigeria. The study uses time-series techniques of Cointegration and Granger Causality to achieve this fate.

The paper is organised as follows. Section 2 presents, the theoretical and empirical literature on finance and growth. Section 3 describes the estimation procedure, data used as proxies for financial and real sector while, section 4 discusses the analysis results. Section 5 concludes.

2. LITERATURE REVIEW

In the literature, there are divergent view about the most appropriate perspective with which to understand the interaction between financial development and economic growth. Some studies support the proposition that growth induces financial development (Demand-Pulling Hypothesis) while some view financial systems as the major factor that spurs economic growth (Supply-Leading Hypothesis).

The supply leading hypothesis (SLH) argues that the effect run from financial development to economic growth. SLH identifies three major channels through which financial sector stimulates economic growth; namely (i) enhancing marginal productivity of capital through project evaluation and risk management; (ii) increase the efficiency of financial intermediation and; (iii) mobilise private saving. This view was brought to limelight in early 19th century by Schumpeter. The view has enjoyed considerable empirical supports from

both developed and developing economies (See: Levine, Loayza and Beck 2000; Calderon and Liu, 2003; Neusser and Kugler, 1998; and Akinboade, 1998 among others).

The Demand-Pulling Hypothesis (DPH) postulates that causality runs from economic growth to financial development. The rapid growth in real income is hypothesised to increase demand for financial services, thus, real economic growth induces financial sector expansion. Proponents of this line of reasoning include, Robinson (1952), Gurley and Shaw (1967) and Jung (1986) among many others.

Various proxies have been used in the literature to capture financial sector, some to capture the depth of the financial system while some are meant to capture financial efficiency. Variables used as proxies for financial depth include, total deposits of banking institutions to GDP[1] (Thornton, 1996), total credit to GDP (Levine *et al*., 2000) and credit liquid liabilities to asset of banks (Beck et al, 2000) among others. Efficiency of the financial system has been proxied by monetary authorities' credits to total credit (King and Levine, 1993), spread (Eschenbach *et al.*, 2000), asset of monetary authorities to GDP among many others.

The seeming conclusion from the foregoing is that the empirical evidence regarding the relationship between financial development and economic growth remains inconclusive in both developed and developing countries. This paper contributes to the economic study of this interaction in developing countries, specifically, Nigeria.

3. ESTIMATION PROCEDURE AND DATA DESCRIPTION

3.1 Estimation Procedure

The descriptive statistics, which is meant to explore the salient characteristics of the variables employed in the study, is first carried out. This is followed by Pairwise Correlation analysis that shows the extent to which the variables are correlated. The statistical properties of the time series, in term of stationarity, are undertaken to avoid the hazard of running a spurious regression. Both *Augmented Dickey-Fuller* (ADF) and *Phillips-Perron Unit root* tests are used. Following this is the Johansen Cointegration test to establish, if there is any long-run relation(s) among variables employed. Both granger causality and vector error correction model are carried out to establish the direction of causality in the short and long-

[1] GDP means gross domestic product.

run depending on result obtained from the Johansen Cointegration test. Impulse response and variance decomposition analysis are also carried out to understand the dynamics of the variables response to shocks from one another and the extent of impact of each random innovation on the employed variables.

3.2 Data

Data are from the *Central Bank of Nigeria Statistical Bulletin* (**CBN**, various years). Growth rate of gross domestic product (**GGDP**) is computed as the growth rate of current gross domestic product. Total domestic credit as ratio of output (**TCY**) is computed as domestic credit divided by current gross domestic output. Spread (**SPR**) is the difference between lending rate and deposit rate. **GGDP** is used as proxy for the real sector while **TCY** and **SPR** are proxies for financial sector. **TCY** measures the depth of the financial system, **SPR** measures the efficiency of the financial system and it can also be regarded as the measure of competitiveness (the higher the values, the less efficient the indicators). Annual observation from Nigeria over the period 1970 to 2010 is employed in this analysis. In all, the analysis employs a sample with 40 annual observations for each variable employed.

4. THE ESTIMATION RESULTS

In this section, results of the analysis as itemised in section 3.1 are presented.

The descriptive statistics of the employed variables are presented in table 1.

Table 1: Descriptive statistics

	GGDP	TCY	SPR
Mean	23.58953	0.241273	0.050592
Median	17.90518	0.189951	0.052172
Maximum	112.4212	0.589254	0.106300
Minimum	-88.11013	-0.029329	0.003100
Std. Dev.	31.54748	0.159990	0.024998
Skewness	0.010032	0.756014	0.105339
Kurtosis	7.260509	2.619570	2.304726
Jarque-Bera	30.25390	4.051597	0.879651
Probability	0.000000	0.131888	0.644149
Sum	943.5812	9.650937	2.023664
Sum Sq. Dev	38814.51	0.998276	0.024372
Observations	40	40	40

A closer observation reveals that the mean and medium values are very close for **TCY** and **SPR**, implying stable time series of proxy measures, during sample periods. However, the mean for **GGDP** was 23.59 while the median was 17.91. The standard deviations ranged between 31.55 and 0.0249. All the variables are positively skewed. **GGDP** has the highest peak which is about 7.26, while **SPR** has the lowest (2.3). With low probability values of the Jarque-Bera coefficients for **GGDP** as presented in table 1, the hypothesis of normal distribution is rejected at 1% significant level. The hypothesis of normal distribution is rejected at 5% significant level for **TCY** and at 10% significant level for **SPR**.

The correlation analysis of the variables employed as presented in table 2 reveals that the coefficient of correlation among the variables employed are relatively low. This implies that problem of "multicollinearity" is minimised in the analysis.

Table 2: Pairwise Correlation Matrix

	GGDP	TCY	SPR
GGDP	1.000000	-0.118179	0.204417
TCY	-0.118179	1.000000	-0.488141
SPR	0.204417	-0.488141	1.000000

The variables employed in this analysis were tested for stationarity. Tables 3 presents the results of Augmented Dickey-Fuller unit root test. **GGDP** was significant at level for intercept as well as trend and intercept deterministic. **TCY** and **SPR** were significant at first difference for both deterministic ADF tests.

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Table 3: Augmented Dickey-Fuller (ADF) Unit Root Test -Annual data 1970-2010

Variables	Deterministic	Levels		First Difference	
		t-Statistic	Probability	t-Statistic	Probability
GGDP	Intercept	-4.81378	0.0004*		
	Trend and Intercept	-4.79924	0.0021*		
TCY	Intercept	-2.11705	0.2393	-5.61654	0.0000*
	Trend and Intercept	-2.57447	0.2933	-5.69949	0.0002*
SPR	Intercept	-1.812863	0.3691	-7.125717	0.0000*
	Trend and Intercept	-2.197726	0.4779	-7.034315	0.0000*

Note: *denotes significance of probability value at 1% level

Table 4 presents results of the Phillips-Perron unit root test. The results of the test are not contrary to that of the ADF. These affirmed the stationarity of the variables employed.

Table 4: Phillips-Perron Unit Root Test -Annual data 1970-2010

Variables	Deterministic	Levels		First Difference	
		t-Statistic	Probability	t-Statistic	Probability
GGDP	Intercept	-4.70177	0.0005*		
	Trend and Intercept	-4.70243	0.0028*		
TCY	Intercept	-2.15627	0.2248	-5.70598	0.0000*
	Trend and Intercept	-2.13127	0.5133	-6.44822	0.0000*
SPR	Intercept	-1.754653	0.3969	-7.276260	0.0000*
	Trend and Intercept	-2.197726	0.4779	-7.179380	0.0000*

Note: *denotes significance of probability value at 1% level

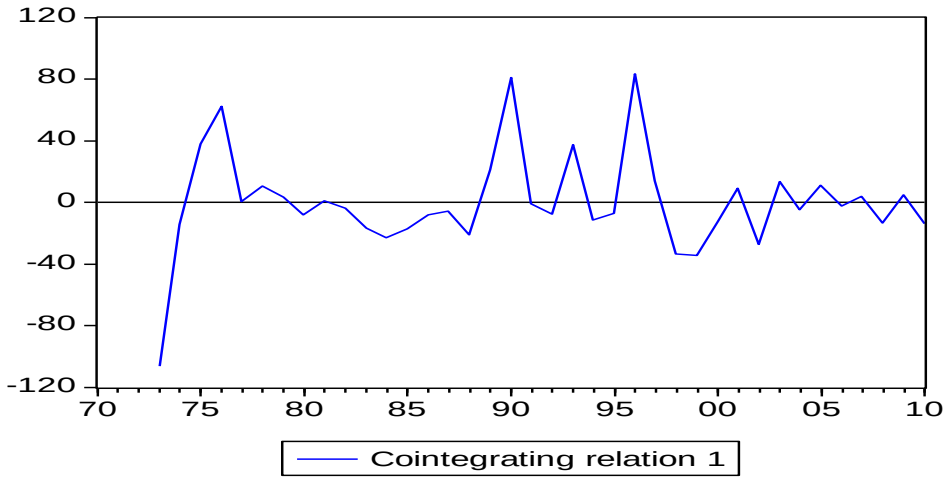
Table 5 presents the Johansen Cointegration Tests' Summary for the five types of cointegrating relations that can be observed. In all both trace and Max Eig test indicate one cointegrating relation.

Table 5: Johansen Cointegration Test Summary

Data Trend	None	None	Linear	Linear	Quadratic
Rank or No. of CEs	No Intercept No Trend	Intercept No Trend	Intercept No Trend	Intercept Trend	Intercept Trend
Selected (5% level) Number of Cointegrating Relations by Model (Columns)					
Trace	1	1	1	1	1
Max-Eig	1	1	1	1	1

Akaike Information Criteria and Schwarz Criteria indicate that the appropriate lag for the model is one and that the best assumption to assume for the variables is "intercept with no trend" (see: Appendix 2). Figure 1 displays the Cointegrating graph of the estimated cointegrating relations. The graph depicts the curve of the cointegrating relation.

Figure 1: Cointegrating Graph



One of the ways to establish causality among variables is to employ granger causality test as proposed by Granger and Engle (1987). Pairwise granger causality test was conducted. Table 6 presents the result of the test. The test results' show no causality among the employed variables, except that one of the null hypothesis, "**TCY** does not Granger Cause **GGDP**", is rejected at 10% significant level but not at 5% level of significance. This result however does not imply absence of meaningful relationship among the variables in the long run.

Table 6: Granger Causality Test Results

Null Hypothesis	F-Statistic	Probability
TCY does not Granger Cause GGDP	3.71197	0.06195
GGDP does not Granger Cause TCY	0.34563	0.56027
SPR does not Granger Cause GGDP	0.15294	0.69804
GGDP does not Granger Cause SPR	1.10087	0.30107
SPR does not Granger Cause TCY	1.23072	0.27442
TCY does not Granger Cause SPR	0.04060	0.84142

A cointegration relation implies, at least, a causal relationship in the long run. Determining the direction of this relation requires estimating VEC model since granger causality test failed to establish the direction of causation. To understanding the direction of causality in the long run among real sector and financial sector in Nigeria, vector error correction

estimation with one lag was employed. The lag length was set based on the Schwarz and Akaike Information Criteria (see Appendix 3 for the detailed result). Table 7 presents the summary of VEC model estimation.

Table 7: Vector Error Correction Model Estimation Results

VEC Model	1	2	3
Dependent Variable	D(GGDP)	D(TCY)	D(SPR)
ECT	-0.99742	0.0012	0.00009
Standard Eror (SE)	(0.1961)	(0.00073)	(0.0011)
t-statistics	[-5.08641]	[1.64877]	[0.79632]
	√	×	×
Sign of ECT	√	√	√
Magnitude of ECT	√	√	√
Significance of ECT	√	×	×
DECISION	ACCEPT	REJECT	REJECT

The error correction term (ECT), which is coefficient of the error correction is the term that shows the speed with which the model converges to equilibrium. ECT is the proportion of the disequilibrium in dependent variable in one period that is corrected in the next period. From 7, model 1 which is the model that has real sector variables as the dependent variable is the model that conform to the criteria for acceptance while models 2 and 3, which represent the financial sector depth and efficiency respective, are rejected. ECT coefficient (-0.9974) in the real sector equation (model 1) means that about 99.74% of the discrepancy between the actual and the long run equilibrium is corrected annually. The VEC model results demonstrate that there is long run causality running from the financial sector to real sector in Nigeria. These results provide evidence that the relationship between financial and real sectors follows a supply-leading hypothesis.

Figures 2 present the impulse response analysis of the employed variables. The impulse response functions show how one variable responds overtime to a single innovation in itself or another variable. Innovations in the variables are denoted by shocks in the error terms in the equations. Figure 3 and variance decomposition of the employed variables. Variance decomposition reinforces the results of the impulse response functions by determining the relative importance of each variable in generating fluctuations in other variables.

Figure 2: Impulse Response Analysis

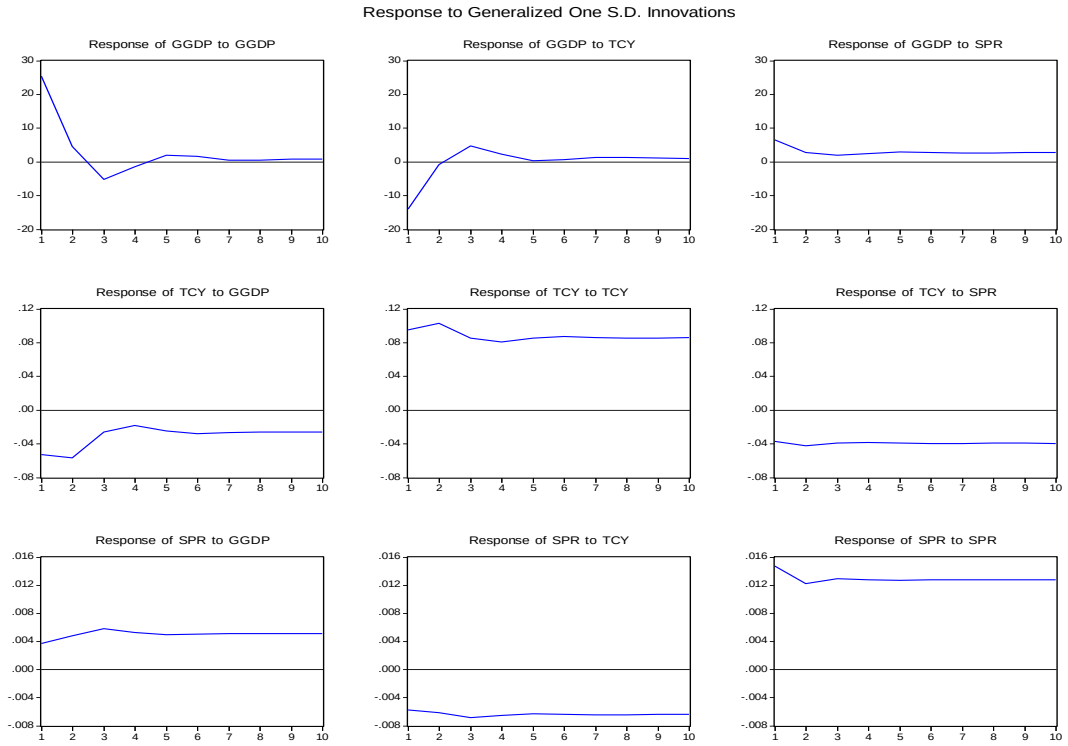
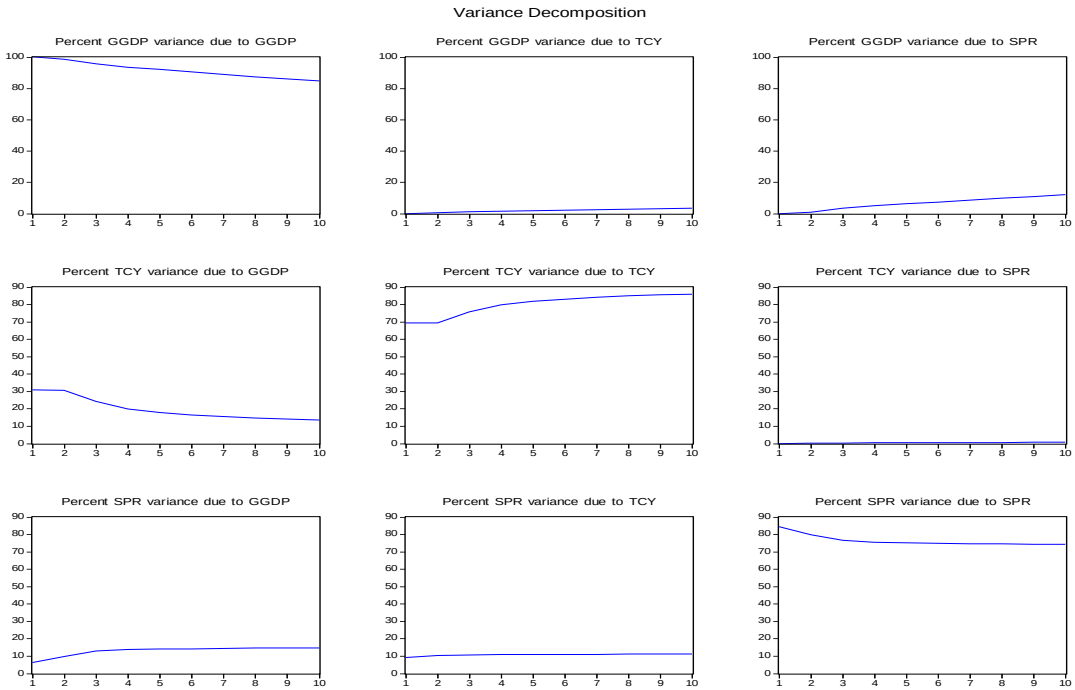


Figure 3: Variance Decomposition Analysis



5. CONCLUSION

This paper investigated the causal relationship between financial and real sectors. Specifically, the paper exams the validity of either the Supply- Leading hypothesis or the Demand-Pulling hypothesis holds in Nigeria. Granger causality test and cointegrated vector error correction model were applied to test the causality between two proxies of financial sector (financial efficiency and level of competitiveness) and one proxy of real sector (growth rate of output) in Nigeria for the period 1970 to 2010.

Time series were examined to determine their stationarity using the ADF and Phillips-Perron unit root tests. The results of the Johansen cointegration tests indicate the existence of one cointegrating relation between financial sector variables and real sector variable. Therefore, the three variables have a long run equilibrium relationship. VECM estimates indicate the existence of one way directional causality running from the financial to real sector in the long run. Therefore, these results provide evidence that the relationship between financial and real sector in Nigeria follows a supply leading trend. The finding in this empirical study supports Schumpeter's (1911) postulation that financial development causes economic growth and is consistent with those obtained by Eita and Jordaan (2007) for Botswana and Odhiambo (2005) for Tanzania among others.

Since there is long run relationship between the financial and real sector in Nigeria, and the direction of causation is from the financial to real sector, sound financial sector is expected to enhance speedy development of the real sector in Nigeria. Policy makers are thus expected to regulate the financial institutions to curtail "selective credit advances" that are presently in practice. Framework that ensures funding of real production (due to its high marginal productivity presently in Nigeria) alongside the financing of service related activities (which are presently the case) should be developed. Incentives and proper sanctions should be put in place to reward and check the excesses of players in the financial sector. Efficient evaluation and proper monitoring should be in place to restrain sharp practices.

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APPENDIX

1. Granger Causality Tests

Pairwise Granger Causality Tests
Date: 07/17/12 Time: 22:42
Sample: 1970 2010
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Probability
TCY does not Granger Cause GGDP	39	3.71197	0.06195
GGDP does not Granger Cause TCY		0.34563	0.56027
SPR does not Granger Cause GGDP	39	0.15294	0.69804
GGDP does not Granger Cause SPR		1.10087	0.30107
SPR does not Granger Cause TCY	40	1.23072	0.27442
TCY does not Granger Cause SPR		0.04060	0.84142

2. Johansen Cointegration Test Summary

Date: 07/18/12 Time: 08:28
Sample: 1970 2010
Included observations: 36
Series: GGDP TCY SPR
Lags interval: 1 to 3

Data Trend:	None	None	Linear	Linear	Quadratic
Rank or No. of CEs	No Intercept No Trend	Intercept No Trend	Intercept No Trend	Intercept Trend	Intercept Trend
Selected	(5% level)	Number of	Cointegrating	Relations by	Model(columns)
Trace	1	1	1	1	1
Max-Eig	1	1	1	1	1
Log (rows)	Likelihood	by Rank and	Model(columns)		
0	-17.46900	-17.46900	-17.35135	-17.35135	-13.56450
1	-6.672285	-3.373094	-3.273581	-2.077436	1.524833
2	-3.962608	0.156818	0.204342	2.333557	4.917309
3	-3.945562	2.607937	2.607937	4.998257	4.998257
Akaike and	Information	Criteria by	Rank (rows)	Model	(columns)
0	2.470500	2.470500	2.630631	2.630631	2.586917
1	2.204016	2.076283*	2.181866	2.170969	2.081954
2	2.386812	2.269066	2.321981	2.314802	2.226816
3	2.719198	2.521781	2.521781	2.555652	2.555652
Schwarz	Criteria by	Rank (rows)	and Model	(columns)	
0	3.658139	3.658139	3.950230	3.950230	4.038476
1	3.655575	3.571829*	3.765385	3.798474	3.797433
2	4.102290	4.072518	4.169420	4.250214	4.206215
3	4.698597	4.633140	4.633140	4.798971	4.798971

3. Vector Error Correction Results

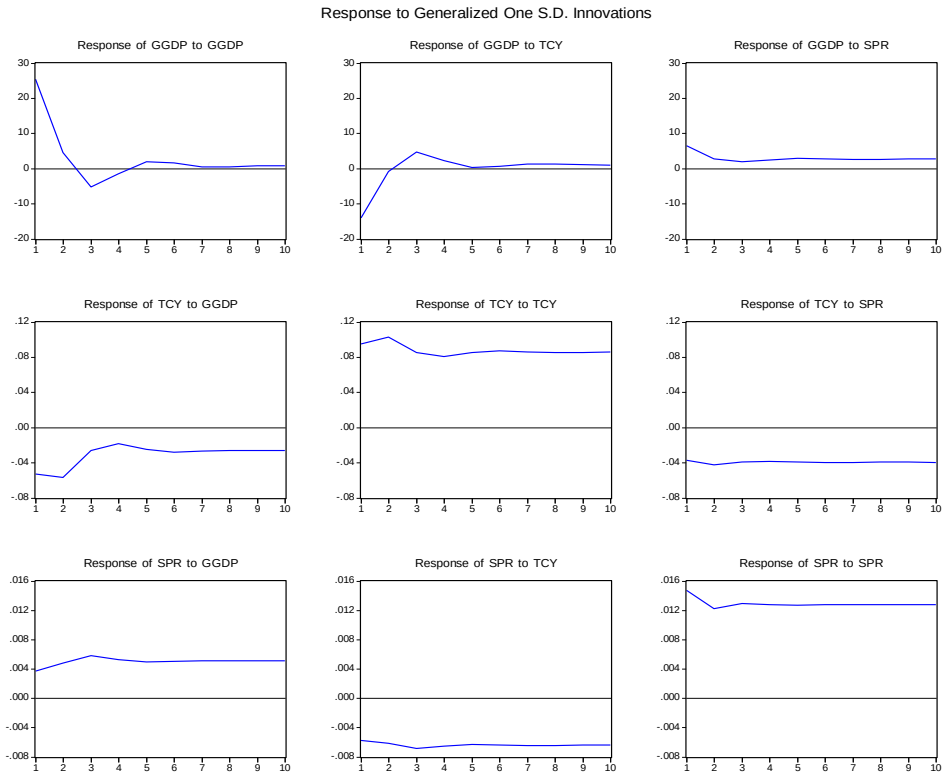
Vector Error Correction Estimates
Date: 07/17/12 Time: 22:27
Sample(adjusted): 1973 2010
Included observations: 38 after adjusting endpoints
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1
GGDP(-1)	1.000000
TCY(-1)	-36.45712
	(30.4071)
	[-1.19897]
SPR(-1)	-321.8358
	(184.415)
	[-1.74517]
C	1.209235

Error Correction:	D(GGDP)	D(TCY)	D(SPR)
CointEq1	-0.997426	0.001209	9.04E-05
	(0.19610)	(0.00073)	(0.00011)
	[-5.08641]	[1.64877]	[0.79632]
D(GGDP(-1))	0.222671	-0.001178	-3.79E-05
	(0.13566)	(0.00051)	(7.9E-05)
	[1.64138]	[-2.32132]	[-0.48288]
D(TCY(-1))	-1.547252	0.117430	-0.006208
	(57.9701)	(0.21680)	(0.03355)
	[-0.02669]	[0.54165]	[-0.18503]
D(SPR(-1))	-145.0276	0.187920	-0.185725
	(310.982)	(1.16302)	(0.17999)
	[-0.46635]	[0.16158]	[-1.03183]
C	2.644891	-0.002850	0.000428
	(4.12844)	(0.01544)	(0.00239)
	[0.64065]	[-0.18461]	[0.17928]
R-squared	0.568539	0.155952	0.058209
Adj. R-squared	0.516241	0.053643	-0.055947
Sum sq. resids	21331.37	0.298351	0.007146
S.E. equation	25.42450	0.095084	0.014716
F-statistic	10.87108	1.524325	0.509908
Log likelihood	-174.1963	38.17470	109.0771
Akaike AIC	9.431383	-1.746037	-5.477742
Schwarz SC	9.646854	-1.530565	-5.262270
Mean dependent	2.555536	-0.002365	0.000356
S.D. dependent	36.55423	0.097742	0.014320

Determinant Residual Covariance		0.000739
Log Likelihood		-16.73115
Log Likelihood (d.f. adjusted)		-24.77263
Akaike Information Criteria		2.251191
Schwarz Criteria		3.026890

4. Impulse Responses



5. Variance Decomposition