

Inter-Dependency and Causality in Consumption, Income and Economic Growth in Pakistan (1960-2005)

Abdul Qayyum Khan*, Muhammad Azam**

Abstract

The objectives of this paper are to critically evaluate causality, vulnerability to innovation of consumption, income and economic growth. In methodological terms the paper uses annual data for the period 1960-2005, taken from Economic Survey of Pakistan (various issues) and International Financial Statistics (2005). Vector Autoregressive (VAR) model with impulse response function (IRF), error variance decomposition and Granger Causality test is used for the analysis. The study showed that any innovation of one standard deviation took seven years for economic growth and more than ten years for consumption and income. The variation in consumption is mostly explained in their own. The variation in income is mostly explained by consumption. The variation in economic growth is slightly explained by consumption and income. Bilateral causality is not found, and mostly independent type relationships are detected. Based on the finding of the study, it is recommended to harmonize fiscal policies with monetary policy. The gap between policy formation and its implementation specifically in monetary policy required to reduce. Through fiscal policies the government can easily enhance income, consumption level, productive capacity of the economy, employment opportunities and reduce poverty level. But at the same time effective managing of monetary and fiscal policies are needed to accommodate the enhanced consumption from indigenous production rather than concentrating on import.

* Dr. Abdul Qayyum Khan, Assistant Professor of Economics, Dept. of Economics, Hazara University Mansehra. Email: qayyum_72@yahoo.com

** Dr. Muhammad Azam, Assistant Professor of Economics, Dept. Management Sciences, Abdul Wali Khan University Mardan. Email: khan_azam75@yahoo.com

Introduction

The government adopted a deliberate policy (in 1960s), of concentrating national income in the hands of the upper income groups on the basis of economic assumption that the rich save a larger proportion of their income and hence a higher national savings rate could be achieved with an unequal distribution of income. In practice the assumption that it would elevate domestic savings over the time failed to become visible, while the policy of dispensing incomes in favour of the economic elite succeeded. In the rural sector, 15 percent of resources generated annually were moved to the urban industrialists and 63 to 85 per cent of these moved resources went into increased urban consumption. The actual savings rate remained below 12 per cent and never raise to targeted domestic saving rate of 25 per cent (Griffin, 1965).

The majority of Pakistan's population was suffering an absolute decline in their living standards, while an elite and highly monopolistic class was accruing wealth, during the process of rapid economic growth of the 1960s. In 1969-70 per capita consumption of food grain of the poorest 60 per cent of Pakistan's urban population declined to 96.1 from an index of 100 in 1963-64. Over the same period in the case of the poorest 60 per cent of rural population the decline was even greater. In 1969-70 per capita consumption of food grain declined to only 91 from an index of 100 in 1963-64, in case of the poorest 60 per cent of rural population (Hamid, 1974). Rural sector poverty was so grave in 1971-72, that 82 per cent of rural households could not afford to provide even 2,100 calories per day per family member (Naseem, 1977).

Investment undertaken were hardly finance from internally generated funds, thereby requiring heavy borrowing from foreign governments. The ability to finance increased government expenditures

from tax revenue were constrained by two factors: (i) slowing down of GDP growth, and (ii) inability of government to improve direct taxation coverage, as a result, the deficit increased rapidly. The government reduced subsidies on consumption goods and increase indirect taxation in order to control the rising budget deficit. However, in the face of increasing current expenditures these measures failed to reduce the budget deficit. Monetary expansions were approached to finance budget deficit, ensuing in accelerated inflation.

The booms in the construction and consumption linked with Middle East remittances coupled with the easing of budgetary pressures, helped in stimulating economic growth. GDP average growth reached to 6.6 per cent during the Zia period 1978-88, as it was about 5 per cent during the Z.A. Bhutto period 1973-77. The gross fixed capital formation as a percentage of GDP was 15.5 per cent in the Bhutto period and reached to 16.8 per cent in the Zia period (Economic Survey of Pakistan, 1980).

Blanchard and Perotti (2002) and Fatás and Mihov (2001) identified exogenous shocks to government consumption by assuming that the government consumption is prearranged comparative to the other variables included in their VAR model. Their most applicable conclusions for our interests can be summarized as follows. First, a positive shock to government consumption brings about an unrelenting rise in that consumption variable. Second, the fiscal extension raises a positive response in output, with the implied multiplier being greater than one in Fatás and Mihov (2001), but close to one in Blanchard and Perotti (2002). Third, in both these studies the fiscal expansion leads to large (and significant) increases in consumption. Fourth, the response of investment to the consumption shock is found to be insignificant in Fatás

and Mihov (2001), but negative (and significant) in Blanchard and Perotti (2002). Perotti (2002) extended the methodology of Blanchard and Perotti (2002) to data for the Australia, Canada, U.K. and Germany. Their qualitatively findings similar to the ones obtained for the U.S. concerning the response of consumption (positive) and investment (negative) to an exogenous raise in government spending.

In similar work, Mountford and Uhlig (2002) used the skeptic classification procedure originally proposed in Uhlig (1997) (anchored in sign and near-zero limitations on impulse responses) to categorize and estimate the effects of a “balanced budget” and a “deficit spending” shock. As in Blanchard and Perotti (2002), Mountford and Uhlig (2002) found that government consumption shocks crowd out both residential and non-residential investment, but did not decrease private consumption.

Overall, the evidence discussed above as tending to support the predictions of the Keynesian model, over those of the Neoclassical model. In order to evaluate the strength of the above findings and the behavior of alternative variables of interest, in this paper attempt has been made to provide some complementary evidence using the Impulse Response Function (IRF) and variance decomposition strategies for Pakistan.

Objectives

The main objectives of the study are (i) To appreciate the inter-relationships among the consumption, income and economic growth (ii) To detect which of the three variables are more vulnerable to innovation (iii) To verify if we can detect causal links among some of the three variables.

Materials and Methods

Time series data for the sample period 1960-2005, which are taken from Economic survey of Pakistan various issues, and International Financial Statistics is used. To determine the stationarity of data, an Augmented Dickey-Fuller (ADF) test is used. The Akaike information criterion is used to select the optimum ADF lag. Stationarity of the variables are checked once with an intercept is included only, and again when both an intercept and a linear deterministic trend is included. Variables which are non-stationary at level make stationary after taking first difference. Vector Autoregression (VAR) model, which treats all the variables in the system as endogenous is used to analyze the dynamic impact of the random errors on the variable's system. In order to encapsulate the causality among the three main variables of the study (consumption, income and economic growth) Granger causality test is used. A statistical package Eview is used for deriving the results. More specifically, the following multivariate VAR model of order P is used for estimation:

$$y_t = K + \sum_{i=1}^n \alpha_i x_t + \sum_{i=1}^n \beta_i y_{t-1} + U_t$$

(1)

Where x_t and y_t is a $(n \times 1)$ vector of endogenous variables being considered (consumption, income and economic growth) α_i and β_i is $(n \times n)$ matrix of coefficient, K is the vector of constant, P is the number of lags and U_t is a $(n \times 1)$ vector of uncorrelated white noise disturbances.

Results and Discussion

Non Stationarity of the Time Series

Table I presents the results of the unit root test. All the three variables are non-stationary when intercept is included only, and after inclusion of trend the variables remain non-stationary.

Table I ADF Test for Stationarity

Variables	Include intercept only		Include intercept and trend		Result
	Test statistics ¹	Critical Value	Test statistics ¹	Critical Value	
PC	0.4985[1]	-3.5814	-2.7179[0]	-4.1781	I(1)*
	(-6.5707) ² [0]	-3.5889	(-5.9008)[2]	-4.1896	I(1)**
PI	0.2681[1]	-3.5814	-2.1363[2]	-4.1728	I(1)*
	-6.8389[2]	-3.5850	-6.8160[2]	-4.1896	I(1)**
EG	-2.3555[2]	-3.5814	-2.6314[2]	-4.1728	I(1)*
	-5.1552[0]	-3.5850	-4.9631[2]	-4.1896	I(1)**

¹Figures in square brackets besides each statistics represent optimum lags selected using the minimum AIC value.

²Figures in Parentheses are first difference of variables, * shows result when intercept is included only,

** Show results when intercept and trend is included.

Co-integration of the Variables– The Johansen Test

Johansen Likelihood Ratio (LR) test is used to find out the co integration in the regressions used for analysis. The result of Likelihood Ratio (LR) test is depicted in table II. The Likelihood Ratio (LR) test results point out that the assumption of no co integration has been rejected for all equations by Likelihood Ratio (LR) statistics. The test denotes the existence of two co integrating equations as the calculated values of

Likelihood Ratio (LR) statistics are greater than the critical values at 5 percent as well as 1 percent. The test results show that the variables are co integrating and they have long-term relationships.

Table II Johansen co integration test result with intercept (no trend) in CE and no intercept in VAR. (Variables included in the co integrating vector: PC, PI and EG).

Test assumption: No deterministic trend in the data. Lag interval is 1 to 1

Eigenvalue	Likelihood Ratio	5 Percent Critical Value	1 Percent Critical Value	Hypothesized No. of CE(s)
0.5093	60.64	34.91	41.07	None **
0.3829	29.32	19.96	24.60	At most 1 **
0.1678	8.08	9.24	12.97	At most 2

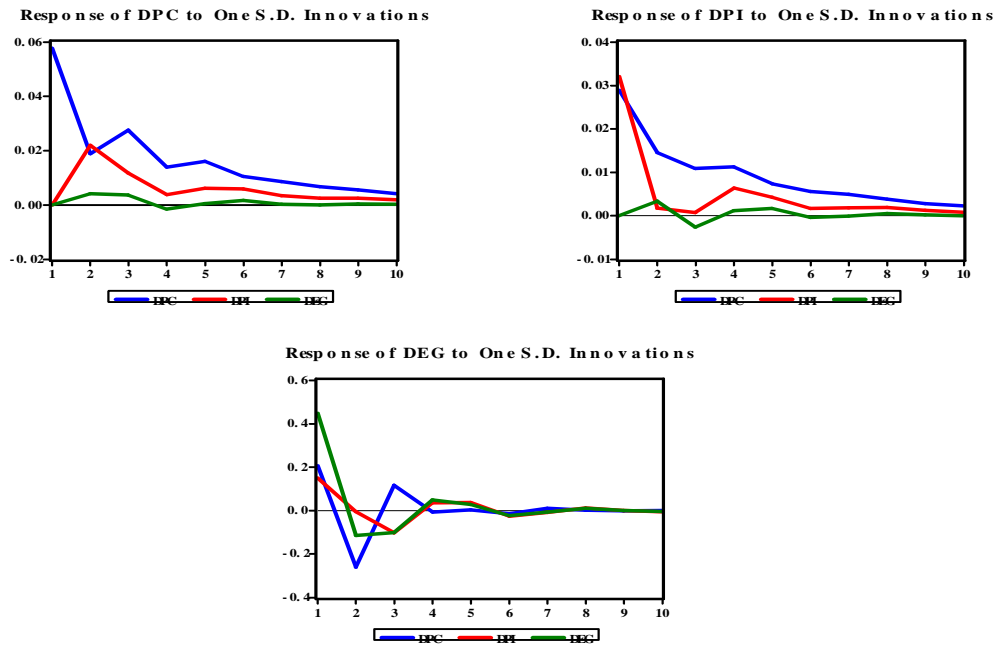
*(**) denotes rejection of the hypothesis at 5%(1%) significance level. L.R. test indicates 2 co integrating equation(s) at 5% significance level

Impulse Response Functions- Graphical Analysis

Response of Variables to Impulse of 1 SD- Combined Graphics

The graphical illustration gives the evaluation of the three variables in IRF terms to variations, unitary innovation or shocks (of one standard deviation). Figure 1 translates the rapidity of absorption of the innovation by the three variables. It is found that the absorption takes 7 years for economic growth, and more than 10 years for income and consumption.

Fig. 1 Economical response to impulses of 1 standard deviation (D.V) innovations



Economical Response to Impulses of Standard Deviation +/-2 Standard Errors- Multiple Response Graphics

Figure 2 and table III indicate the three variables response to innovations introduced in the VAR model structure. The result indicates the response or the absorption rhythm of each one of the three variables to innovation or impulses of size 1 s.d. +/- 2 s.e. The first, second and third graph in row 1 of Figure 2 and first, second and third columns of “Response of DPC” of table III give the response of the consumption to innovations or impulses introduced by itself, by income and by economic growth respectively. The first, second and third graph in row 2 of Figure 2 and first, second and third columns of “Response of DPI” of table III give the response of the income to innovations or impulses introduced by

consumption, by itself and by economic growth respectively. In similar fashion the first, second and third graph in row 3 of Figure 2 and first, second and third columns of “Response of DEG” of table III give the response of the economic growth to innovations or impulses introduced by consumption, by income and by itself.

Fig. 2 Economical responses to impulses of 1 standard deviation (D.V) +/- 2 standard errors

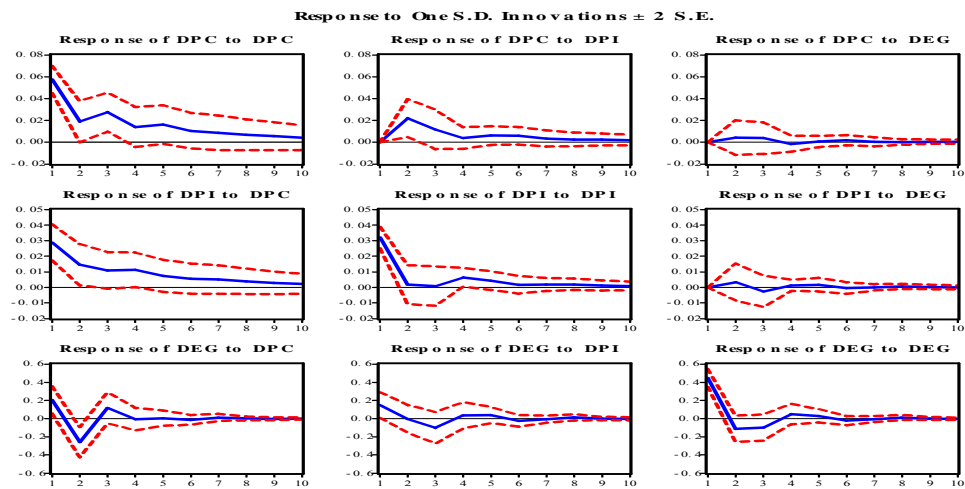


Table III: Values of the impulse response function (IRF)

Response of DPC:			
Period	DPC	DPI	DEG
1	0.057655	0.000000	0.000000
3	0.027606	0.011748	0.003688
6	0.010498	0.005926	0.001767
9	0.005556	0.002492	0.000481
10	0.004145	0.001931	0.000361
Response of DPI:			

Period	DPC	DPI	DEG
1	0.028886	0.032056	0.000000
3	0.010847	0.000772	-0.002585
6	0.005604	0.001686	-0.000385
9	0.002838	0.001278	0.000193
10	0.002319	0.000837	-1.03E-05
Response of DFB:			
Period	DPC	DPI	DEG
1	0.206821	0.149692	0.448084
3	0.116525	-0.102349	-0.099959
6	-0.014591	-0.025323	-0.023138
9	-0.001825	0.000648	0.000460
10	-6.69E-05	-0.004556	-0.004183
Ordering: DPC DPI DEG			

Variance Decomposition

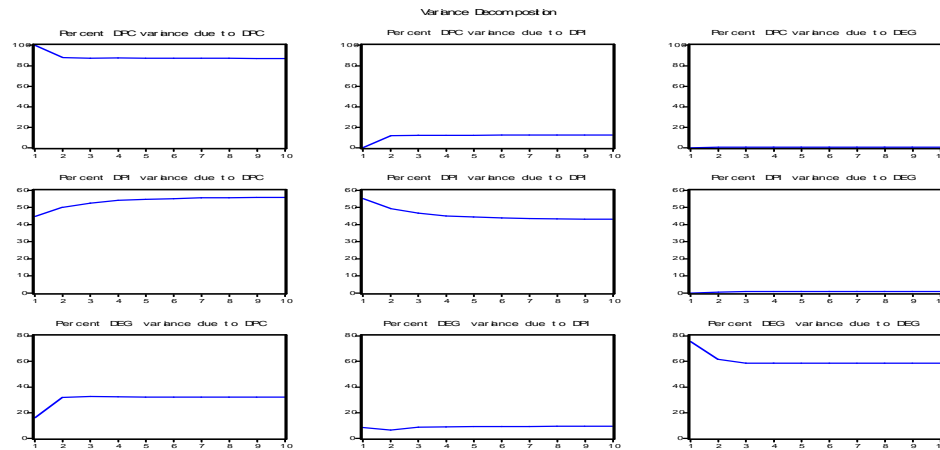
In Figure 3 and Table IV the values of variance decomposition of the three variables are given. This table values show how the variance of each one of the series is decomposed during a period of ten years. The first group of columns in Table IV is referred to consumption. Those values of standard errors that consumption explains by itself lies between 87% to 100%, with values descending slowly. Income is the second variable to explain most the variation in consumption with values ranging from 0 to 12.38%. Economic growth explains 0 to .62% variations in consumption. The second group of columns refers to the income variance decomposition. Income by itself explains variation between 55.19% to 43.15%. Consumption and economic growth explain 44.81% to 55.95% and 0 to .89% of variation in income. The third group

of columns shows the economic growth variance decomposition. Economic growth by itself explains variation between 75% to 58%. Consumption and income explain 16% to 32% and 8% to 9% of variation in economic growth.

Table IV: Values of the variance decomposition

Variance Decomposition of DPC:				
Period	S.E.	DPC	DPI	DEG
1	0.057655	100.0000	0.000000	0.000000
3	0.071378	87.20190	12.19187	0.606229
6	0.075829	87.04456	12.31822	0.637221
9	0.076967	87.01211	12.36380	0.624088
10	0.077103	86.99314	12.38278	0.624076
Variance Decomposition of DPI:				
Period	S.E.	DPC	DPI	DEG
1	0.043151	44.81223	55.18777	0.000000
3	0.047037	52.58045	46.61254	0.807008
6	0.049924	55.23186	43.86518	0.902967
9	0.050492	55.87346	43.22928	0.897259
10	0.050553	55.95096	43.15391	0.895130
Variance Decomposition of DEG:				
Period	S.E.	DPC	DPI	DEG
1	0.515715	16.08308	8.425212	75.49170
3	0.616954	32.61412	8.644204	58.74167
6	0.622943	32.06165	9.352199	58.58615
9	0.623334	32.05500	9.393808	58.55120
10	0.623364	32.05184	9.398225	58.54993
Ordering: DPC DPI DEG				

Fig. 3 Variance decomposition



Causality Appreciation

Granger (1969) and Sims (1972) causality test is used to investigate the direction of causality among the three variables i.e. consumption, income and economic growth.

Interpretation of the Causality Results

The results of the regression in Table VI indicate that there are two unilateral causality. One directed from income to consumption and another directed from consumption to economic growth. The coefficient of lagged values of income and consumption as a group is statistically different from zero at 1% level of significance in both cases. The result further indicates that mostly independent type relationships are detected and no bilateral causality is found as in none of the regression set both of the coefficient found to be statistically significant.

Table VI Appreciation of the causality direction in the three variables

Pair wise Granger Causality Tests			
Sample: 1960 2005			
Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Probability
PI does not Granger Cause PC	44	3.50016	0.03999
PC does not Granger Cause PI		1.28628	0.28776
EG does not Granger Cause PC	44	0.57835	0.56556
PC does not Granger Cause EG		4.42006	0.01861
EG does not Granger Cause PI	44	0.80251	0.45547
PI does not Granger Cause EG		0.86629	0.42844

Conclusion and Recommendations

The present study revealed that any innovation of one standard deviation taken place toward economic growth took 7 years, while for consumption and income took more than 10 years to become effective. The results further indicate that the variation in consumption is mostly explained in their own. The variation in income is mostly explained by consumption. The variation in economic growth is explained to some extent by consumption and income.

The results of causality indicate two unilateral causalities, one directed from income to consumption and another directed from consumption to economic growth. Mostly independent type relationships are detected and no bilateral causality is found. The results indicate that consumption is outcome of income and economic growth is the outcome of consumption, rather than income and consumption being a consequence of economic growth.

Based on these evidences it is clear that in Pakistan fiscal policies are more susceptible to innovations or shocks than monetary policy, and fiscal policy took longer time to become effective. It is recommended to harmonize fiscal policies with monetary policy. The gap between policy formation and its implementation specifically in fiscal policy required to reduce. If the government gives priority to fiscal policies improvement and its quick and fair implementation, especially for income enhancement, it can enhance consumption level, which ultimately leads to enhance economic growth, productive capacity of the economy, employment opportunities and reduce poverty level. But at the same time effective running of monetary policy is also needed to accommodate the enhanced consumption from indigenous production rather than concentrating on import.

References

- Bisignano, J. and K. D. Hoover. 1982. Monetary and fiscal impact on exchange rate. *Econ. Review* (Federal Reserve Bank of San Francisco). Pp. 19-33.
- Blanchard, O. and R. Perotti 2002. An empirical characterization of the dynamic effects of changes in Govt. spending and taxes on output. *Quarterly J.of Economics*.117(4): 1329-1368.
- Bundt, T. and A. Solocha 1988. Debt deficits and dollar. *J. Policy Modelling*. 10(4): 581- 600.
- Burney, N.A. and N. Akhtar. 1992. Government budget deficits and exchange rate determination: evidence from Pakistan . *The Pakistan Dev. Review*. 31 (4): 871-882.
- Fatás, A. and I. Mihov 2001. The effects of fiscal policy on consumption and employment: Theory and Evidence. INSEAD, Mimeo. Govt. of Pakistan. *Pakistan Econ. Survey, Various Issues*, Islamabad.
- Govt. of Pakistan. *Pakistan Economic Survey*. 1980. Economic Advisors Wing, Ministry of Finance, Islamabad.
- Granger, C.W.J. 1969. Investigating causal relationships by economics models and cross spectral models. *Econometrica*, 37: 424-438.
- Griffin, K. B.1965. Financing development plans in Pakistan. In Griffin, K. B., and A.R. Khan (eds.). *Growth and inequality in Pakistan*. London: Macmillan. 204-205.
- Hamid, N. 1974. The Burden of capitalist growth, a study of real wages in Pakistan. *Pakistan Eco. and Social Review*.
- Haq, T. A. 2003. Fiscal strategy for growth and employment in Pakistan: An alternative consideration. Employment strategy department (EARU Employment Paper 2003/56).
- Haq, T. A. 2003. Fiscal strategy for growth and employment in Pakistan: An alternative consideration. Employment Strategy Dept. (EARU Employment paper 2003/56).

Hussain, F. and T. Mahmood. 2001. The stock market and the economy of Pakistan. *The Pakistan Dev. Review*. 40(2): 107-114.

IMF. 2003. *International Financial Statistics*. Washington, D.C: Intl. Monetary Fund.

IMF. 2005. *International Financial Statistics*. Washington, D.C: Intl. Monetary Fund.

Johansen, S. 1988. Statistical analysis of cointegrated vectors. *J. Econ. Dynamics and Control*. 12: 231-254.

Johansen, S. 1991. Estimation and hypothesis testing of cointegrating vectors in Gaussian vector autoregression models. *Econometrica*. 59: 551-1580.

Martino, A. 1998. Monetary and fiscal rules. Retrieved on February 12, 2007, from <http://www.cis.org.au/Policy/autumn98/aut9801.htm>.

Mountford, A. and H. Uhlig 2002. What are the effects of fiscal policy Shocks?. Disc. Paper 31. Tilburg Uni. Center for Eco.Research.

Naseem, S.M. (1977). *Rural Poverty and Landlessness in Asia*. Geneva: ILO Report.

Nishat, M. and M. Saghir 1991. The stock market and Pakistan economy. *Savings and Dev*. 15(2):131-145.

Perotti, R. 1999. Fiscal policy in good times and bad. *Quarterly J. of Eco*. 114(4):1399-1436.

Premchand, A. 1984. *Government budgeting and expenditure controls: Theory and practice*. Washington: Int. Monetary Fund. Retrieved on November 16, 2006.

Shah, M. A. 2002. The growth of poverty in Pakistan – issues and causes. Presentation made in NIPA Lahore. Retrieved on Jan.16, 2007, from <http://www.adb.org/Documents/Speeches/2002/ms2002095.asp>.
Sims, C.A. 1972. Money, income and causality. *Amer. Econ. Review*. 62: 540-552