

## **IMPACT OF DEVELOPMENT SPENDING ON ECONOMIC GROWTH MEASURING THE EFFECTIVENESS OF FISCAL POLICY IN SINDH\***

Syed Zia Abbas Rizvi  
Department of Economics  
College of Business Management, Karachi  
Zia-ul-Qamar  
Government National College, Karachi  
Asif Shamim  
Bahria University, Karachi

### **Abstract**

Wagner's law proposes that the development of an industrial economy is accompanied by an increased share of public expenditure in gross national product. During the last 25 years, Wagner's law has been tested very intensively especially for developed countries but some economists believe that increase in government spending doesn't stimulate economic growth. They assume that government spending increases debt liabilities only. They argue that the government can't inject money into the economy without first taking it out of the economy via taxes or borrowing. Hence there is a need to escalate government spending but at the same time economic performance as a whole must improve.

In this paper, we investigate the relationship between government expenditure and Gross Provincial Product (GPP) in the province of Sindh based upon modern time series econometric techniques. We used thirty years data from 1979 to 2008. At first, we applied unit root test in order to investigate the order of integration. After that we used co-integration to check the long run relation

\*Refereed version of a paper earlier presented at the Second International Conference on 'Promoting Socio-Economic Development of Sindh' organised by the Institute of Business Management, Karachi in January 2010.

among variables. Then we used error correction model (ECM) in order to investigate the short run dynamics. In addition, impulse response function (IFS) was also applied to observe the shocks of government spending on economic growth in Pakistan. We found a long run relationship between development expenditures and economic growth. Furthermore, we observed unidirectional causality and found that GDP causes development expenditures. In addition, we found that GDP shocks explain 8% change in development expenditures during the fifth year.

**Key Economic Indicators:** Gross Domestic Product (GDP), Development Expenditure, Budget Deficit and Fiscal Policy

JEL Classification: O510, H51, H5 and H1

## **I. Introduction**

Public spending is extensively seen as having a significant role in supporting economic growth. It is also contended that public sector expenditures may have a negative impact upon economic growth due to the crowding out effect on private sector investment. In Pakistan, the government sets up and maintains operations which would otherwise be undertaken by private corporations (e.g., postal services, public utilities, hospitals).

The rest of the paper proceeds as follows: Section II considers some theoretical issues as well as some empirical results of past studies. In Section III we briefly outline the data set and provide some stylized facts of the main characteristics of the variables that we use in the analysis and econometric methodology. Section IV provides the empirical results of our study, while Section V concludes.

## **II. Literature Review**

The objective of this paper is to examine the relationship between government expenditures and economic growth in the case of Sindh. Different forms of government expenditure and economic growth have been used in the literature. Pryor (1968) used government consumption expenditures instead of using government expenditures to find out the impact of government expenditures on economic growth while Peacock-Wiseman (1961) used total government expenditures. Goffman (1968), Musgrave (1969), Gupta (1967) and Michas (1975) worked on per-capita instead of working on gross domestic product like Mann's (1980).

Wagner's law proposed by the German economist Adolph Wagner (1835-1917) predicts that the development of an industrial economy will be accompanied by an increased share of public expenditure in gross national product. During the last 25 years, Wagner's law has been tested very intensively especially for the developed countries. In recent years, it has also been increasingly tested for developing countries.

Singh and Sahni (1984) initially examined the causal link between government expenditure and national income. Subsequently, their work has generated many other studies, the results of which cover the full continuum from no causality to bi-directional causality between these two variables.

Ram (1986-1987), among the existing causality studies, suggested that differences in the nature of the underlying data, the test procedure and the period studied may explain the diversity in results.

A few years later, Ahsan, Kwan and Sahni (1992) added various other factors that may explain the inconsistency amongst the results obtained by different authors, one of which is the influence of omitted variables. It is suggested that failure to account for omitted variables can give rise to a misleading causal ordering amongst the variables. In 1986, Richard Rahn, formed an inverse relationship between government spending and economic growth for the seven major industrialized countries in the form of a curve.

Baumol (1967) hypothesized that because the output of the government sector is relatively labor intensive, its rate of productivity growth would be expected to be low relative to that of private sector output. Additionally, Lucas (1988) argues that public investment in education increases the level of human capital and this can be seen as a main source of long-run economic growth.

Moreover, Barro (1990) mentions the importance of government expenditure in public infrastructure for economic growth. Romer (1990) stresses the relevance of research and development expenditure. Therefore, composition of public spending is also a relevant issue, and if the aim is to promote growth, the focus should be on the more productive items of the budget, even if the balance between the various functional items of the budget can vary according to the particular circumstances and priorities of each country.

Henrekson (1993) saw three main reasons for the increase in the government's role. First, industrialization and modernization would lead to a substitution of public for private activities. Second, an increase in real income would lead to an expansion of the income elastic "cultural and welfare" expenditures. Third, natural monopolies such as the railroads had to be taken over by the government because private companies would be unable to run these undertakings efficiently because it would be impossible to raise such huge finance that is needed for the development of these natural monopolies.

The aim of this paper is to empirically evaluate the causal link between the size of the public sector and real gross provincial product within the bivariate frameworks, by resorting to recent developments in the theory of cointegrated processes. We employ cointegration analysis, error-correction modeling, causality tests and impulse response function in this study.

### III. The Model and the Data

In this study, we use government development expenditures instead of government expenditures as a percentage of GPP. In addition, we use economic growth instead of using per-capita GPP. We did not work on per-capita because the major part of the labor force is employed in the informal sector in the case of Sindh.

#### III.1 The Model

The model used in this paper is built upon the following augmented function:

$$GPP_t = f(DE_t) \dots\dots\dots(a)$$

Where, GPP is gross provincial product at constant market price while DE symbolizes expenditures on development by the government of Sindh.

For estimation purposes, Equation (a) can be represented by the following LOG form:

$$LGPP_t = a_0 + a_1LDE_t + U_t \dots \dots \dots (b)$$

### III.2 Data

In this study, thirty years' time series data running over 1978-79 to 2007-08 is used for empirical investigation. The data used in this paper comes from different sources. The data on GPP is taken from **Araby (2008)** while the data on development expenditure is taken from various issues of Sindh Development Statistics (SDS).

### III.3 Methodology

In order to find out the long run relationship between variables we first check the order of integration by applying unit root tests. Then, after getting the order of integration the Johansen test of cointegration is applied. Granger causality test is applied to investigate the uni or bi directional causality between variables. For short run dynamics, we apply the Error correction model (ECM). Finally, an impulse response function is applied to trace out the effect of a one-time shock to one of the innovations on current and future values of the endogenous variables.

## IV. Estimation results

### IV.1 Unit root tests

To test the order of integration of the variables we use the standard tests for unit root, namely the Augmented Dickey-Fuller (ADF) test. Results of the test are presented in **Table 1**. The results indicate that both of the variables are integrated of order one. i.e. I(1).

**Table 1: Results of Augmented Dickey-Fuller (ADF)**

Variables	Order of Integration	Number of lags	Level of significance
LGDP	I(1)	0	1%
LDE	I(1)	1	1%

### IV.2 Long run relationship

Equation (b) is estimated using annual data covering the period of 1979-2008. Before testing for the existence of a long run relationship among variables it is important to determine the order of the lag. Results based on several tests except Akaike information criteria (AIC) suggest that optimal lags are two (See Table 2). So, we use two lags for empirical findings.

Table 2: Results of Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	1.418904	NA	0.003585	0.044700	0.141476	0.072568
1	81.48499	141.6554	1.03e-05	-5.806537	<b>-5.516207*</b>	-5.722933
2	<b>87.84495</b>	<b>10.27379*</b>	<b>8.68e-06*</b>	<b>-5.988073*</b>	-5.504190	<b>-5.848732*</b>
3	88.37610	0.776290	1.15e-05	-5.721238	-5.043801	-5.526161
4	89.76923	1.821786	1.46e-05	-5.520710	-4.649720	-5.269896

\* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

The Johansen Cointegration test is applied to investigate the long run relationship between variables. On the basis of our results (See Table 3) we found that both variables are integrated and have a long run relationship.

Table 3: Results of Johansen Cointegration Test

**Unrestricted Cointegration Rank Test (Trace)**

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value
None *	0.375068	19.64193	18.39771
At most 1 *	0.226915	6.948890	3.841466

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level

\* denotes rejection of the hypothesis at the 0.05 level

\*\*MacKinnon-Haug-Michelis (1999) p-values

**Unrestricted Cointegration Rank Test (Maximum Eigenvalue)**

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value
None	0.375068	12.69304	17.14769
At most 1 *	0.226915	6.948890	3.841466

Max-eigenvalue test indicates no cointegration at the 0.05 level

\* denotes rejection of the hypothesis at the 0.05 level

\*\*MacKinnon-Haug-Michelis (1999) p-values

### IV.3 Causality

Correlation does not necessarily imply causation. To overcome this problem the Granger (1969) approach to the question of whether x causes y is used to see how much of the current y can be explained by past values of y and then to see whether adding lagged values of x can improve the explanatory power of the equation. Our findings suggest that development expenditure is caused by GPP while GPP is not caused by development expenditures. In short, we found uni-directional causality between development expenditures and GPP in case of Sindh. Results are given in Table 4.

Table 4: Results of Granger Causality Test

Null Hypothesis:	Obs	F-Statistic	Probability
LDE does not Granger Cause LGPP	28	0.70899	0.50258
<b>LGPP does not Granger Cause LDE</b>		<b>7.93289</b>	<b>0.00240</b>

### IV.4 Short Run Dynamics

The fact that the variables in our model are cointegrated provides support for the use of an error correction model mechanism (ECM) representation in order to investigate the short run dynamics. Estimation results, based on the lag order criterias given in Table 2, are presented in Table 5. The error correction coefficient is significant in nature (i.e. t-value = 2.9) and has a negative sign. This helps reinforce the finding of a long run relationship among the variables in the model. The Error correction model shows that the explanatory variable is insignificant while the error correction term is significantly different from zero. The size of the coefficient of the error correction term (0.41) suggests that our model is not in equilibrium. More precisely, it indicates that around 41 percent of the deviation from equilibrium is corrected each year.

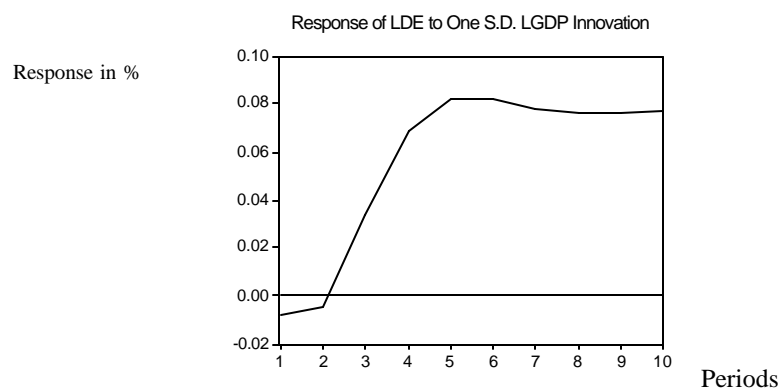
**Table 5: Results of Error Correction Model (ECM)**

Dependent Variable: DLDE

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLGPP	0.210612	1.068813	0.197052	0.8453
E1	-0.413650	0.141475	-2.923847	0.0071
C	0.111585	0.056584	1.972008	0.0593

**IV.5 Impulse Response Function**

We used standard techniques for estimating the impulse response shocks of development expenditure to the only significant variable included in our model i.e. GPP growth. The results are prescribed in the **Graph** given below. We found that GPP shocks explain 8% change in development expenditures during the fifth year.



## V. Conclusion and Policy Recommendations

The objective of this paper is to investigate the relationship between government expenditure and economic growth in Sindh. The data used in this study runs over thirty years from 1978-79 to 2007-08. This was the period when substantial growth in the public sector was observed.

The Johansen Cointegration test has been applied on the variables including government development expenditure and economic growth. The Cointegration method reveals that government expenditure has a long term relationship with economic growth. The Granger causality test investigates that government expenditures are caused by economic growth. Error Correction model showed that there is a short run relationship between government development expenditure and economic growth. We applied the impulse response function test and found that GPP shocks explain 8% change in development expenditures during the fifth year.

### References

Afxentiou, Panos C. and Serletis, Apostolos, (1992) "Modeling the Relationship between Output and Government Expenditures in Canada," *Keio Economic Studies*, Vol 29(1), pp. 17-43.

Ahsan, Syed M, Andy C. Lwan, and Balbir s. Sahni, (1992), "Public Expenditure and Naional Income Causality: Further Evidence on the Role of Omitted Variables," *Southern Economic Journal* 58(3): 623-334.

Barro, J., (1991) "Economic Growth in a Cross Section of Countries" *The Quarterly Journal of Economics*: May 1991.

Goffman, Irving J.,(1968) "On the Empirical Testing of Wagner's Law: A Technical Note," *Public Finance*, Vol. 23(3), pp. 359-64.  
Granger, C. W. J. (1969) "Investigating Causal Relations by Econometric Models and Cross Spectral Methods," *Econometrica*, Vol. 37(3), pp. 424-38.

Granger, C. W. J., (1988) "Some Recent Developments in the Concept of Causality," *Journal of Econometrics*, 39(1/2), pp. 199-211.

Granger, C. W. J. and Newbold, P., (1974) "Spurious Regressions in Econometrics," *Journal of Econometrics*, Vol. 2(2), pp. 111-20.

Gupta, S. P., (1967) "Public Expenditure and Economic Growth: A Time Series Analysis," *Public Finance*, Vol. 22(4), pp. 423-66.

Henrekson, Magnus, (1993) "Wagner's Law — A Spurious relationship," *Public Finance*, Vol 48(2), pp. 406-15.

Mann, Arthur J., (1980) "Wagner's Law: An Econometric Test for Mexico," *National Tax Journal*, Vol. 33(2), pp. 189-201.

Mackinnon, James G., (1991) "Critical Values for Cointegration Tests," in Engle, Robert F. and Clive W. J. Granger (eds) *Long-Run Economic Relationships* (Oxford: Oxford University Press). Chapter 13.

Michas, Nicholas A., (1975) "Wagner's Law of Public Expenditure: What is the Appropriate Measurement for a Valid Test," *Public Finance*, Vol. 30(1), pp. 77-84.

Musgrave, Richard A., (1969) "*Fiscal Systems*" (New Haven: Yale University Press).

Peacock, Alan T. and Wiseman, Jack, (1961) "*The Growth of Government Expenditure in the United Kingdom*" (Princeton: Princeton University Press).

Phillips, P. C. B., (1986) "Understanding Spurious Regressions in Economics," *Journal of Econometrics*, Vol. 33(4), pp. 311-40.

Phillips, Peter C. B. and Perron, Pierre, (1988) "Time Series Regression with a Unit Root," *Biometrika*, Vol. 75(2), pp. 335-46.

Pryor, Frederick L. (1968), "*Public Expenditure in Communist and Capitalist Nations*" (London: George Allen and Unwin).

Ram, Rati, (1986), "Government Size and Economic Growth: A New Framework and some Evidence from Cross-section and Time-series Data," *American Economic Review* 76: 191-203.

Singh, balvir, and Balbir S. Sahni (1984), "Causality between Public Expenditure and National Income," *Public Choice* 90: 215-233.

Schwert, George W. (1989), "Test for Unit Roots: A Monte Carlo Investigation," *Journal of Business and Economic Statistics*, Vol. 7(2), pp. 147-60.

Summers, Robert and Heston, Alan, (1991) "The Penn World Table (Mark5): An Expanded Set of International Comparisons", 1950-88," *Quarterly Journal of Economics*, 106(2), pp. 327-68.

World Bank, (1995) "*Trends in Developing Economies*" Washington, DC: John Hopkins University Press for the World Bank, p. 105.