On the Causal Relationship between Government Expenditure and Tax Revenue in Pakistan

M. Haider Hussain*

Abstract

This paper applies the technique of Granger Causality to determine the relationship between total government expenditures and total tax revenue using annual revised estimates. The analysis discovers a firm unidirectional effect from expenditure to revenue suggesting the preference of controlling the spending decisions to reduce the tax revenue-expenditure deficit.

Introduction

There has always been a debate among economists about the intertemporal association between taxation and government expenditure. This discussion is vital since it corroborates the size of government, budget deficit and the structure of taxation and expenditure themselves. In studying the causal relationship between taxation and expenditure, three possibilities may arise: Expenditure may change (1) simultaneously with tax revenues (2) after the commencement of revenue streams, or (3) before revenues. The first situation is a case where voters of a society take a joint decision vis-à-vis the desired level of taxes and spending together and thereby weigh the costs and benefits of any change in the balanced budget. This case of fiscal synchronisation is observed to the extent where expenditure changes are balanced by contemporaneous taxation. Situation (2) is the case where revenues lead and control the spending decisions. In this case, the ways and means of collecting taxes are driven mainly by political and/or institutional jurisdictions and thereby preferred over economic efficiency, the decision of expenditures is a case followed by the revenue decision. Argument (3) can be thought of as a pro-Keynesian case where deficit budgeting is advocated to boost employment, consumption, saving and production and then the revenue inflows are determined through increased tax revenues[1]. Nonetheless, a possible cause of the failure of this theory in most of the developing countries would be a heavy reliance on consumption expenditures rather than investment expenditures. Furthermore,

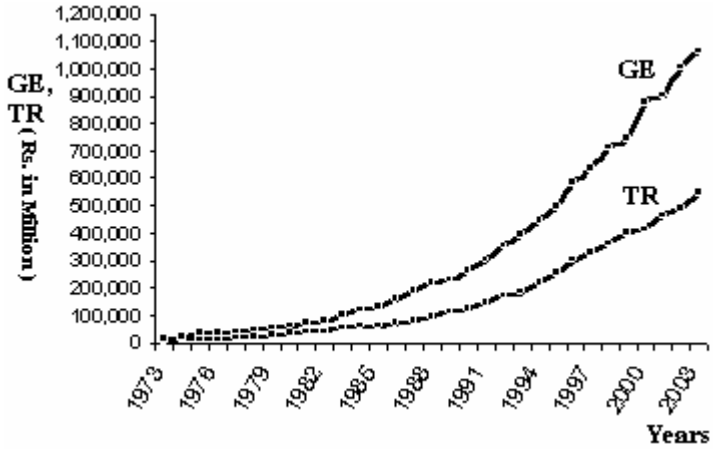
* The author is Research officer at the Social Policy Develop Centre (SPDC), Karachi, Pakistan.

[1] This analysis is that of Frusternberg *et. al.* (1986)

this argument can be supported by another empirical matter; spending decisions are also based on political will. It is argued that if the political majority can deliver expenditure alterations, it will be reflected on the tax side as an aftermath.

The Government of Pakistan collects the major portion of revenue through taxes and surcharges which constitute 65% to 70% of overall revenue collection. The rising gap between total expenditure and total tax revenue has always been a concern of many economists and policymakers. This gap was Rs. 150 million in 1991 when the Resource Mobilisation & Tax Reform Commission was established. In 2003, this gap widened to Rs. 515 million which can be seen from Figure-1. Moreover, it is an empirical fact that most of the tax revenue was deposited to consumption expenditures rather than investment expenditures and this could be a primary cause of this continuously sprouting tax-expenditure gap.

Figure-1: Government Expenditure and Tax Revenue



In this paper, an attempt is made to gauge the primary reasoning of the budget deficit we have been facing. This has been done by estimating the causal relationship between Total Expenditure and Tax Revenue.

The structure of the paper is as follows: Section (I) is dedicated to the literature review, Section (II) illustrates the methodology and data, Section (III) explains the empirical results and major findings and finally Section (IV) concludes the study and presents some policy implications.

I. Review of Selected Literature

The hypotheses of "tax then spend", "spend then tax" and "tax or spend and spend or tax" are all supported by the economic studies regarding different economies. Thus we can classify these studies with respect to the first, second and third hypothesis. Furthermore, a careful examination of these studies reveals that the development stages of a country is nothing or very little to do with the direction of causality as noted by Cheng (1999).

For instance, Friedman (1972, 1978) supports the view that increasing taxes means that one would have just as large a deficit but at a higher level of government expenditures. To him, the direction of causality is from tax revenues to government spending. Buchanan and Wagner (1977) also substantiate this result. In their view, the budget deficit is a primary cause of increased government expenditures. If the government is to finance this deficit entirely through direct taxes, demand for restraining the expenditures would be called for by the society. Blackley (1986) also showed that increasing revenue leads to increased expenditures thus the smaller deficit is ruled out. Manage and Marlow (1986) find the unidirectional causality running from federal receipts to expenditures. However, they criticised the Reagan administration's deficit reduction packages which emphasised the tax increase over deficit reduction pointing out that these packages were designed to reallocate the combination of various revenue sources without concentrating on aggregate spending levels. Marlow and Manage (1987) studied this relationship in state and local government finances of the United States. The Granger test detects that tax receipts cause expenditure for state governments. However, there is no significant relationship found between these two variables in local governments. Owoye (1995) conducted a study of G7 countries and finds that the direction of causality runs from tax revenues to government expenditures in the case of Japan and Italy. Cheng (1999) in a study of eight Latin American countries detects a similar direction for Columbia, the Dominican Republic, Honduras and Paraguay.

On the contrary, Barro (1974), Peacock and Wiseman (1979) support the other view that increased taxes and borrowings are due to increased government expenditures. In their view, it is the political system of a country which decides how much to spend and then finds the resources to finance this spending. Developing countries such as Pakistan apparently face this situation. Moreover, continuous need for social sector reforms also requires increased development expenditures. This result is further supported by Anderson, *et. al.* (1986) who test this hypothesis in the context of the U.S. economy, 1946-1983 using multivariate analysis.

Furstenberg *et. al.* (1986) examined the intertemporal relationship using the VAR model. Their analysis revealed that tax revenues are followed by the decisions of spending: a support for "spend now and tax later" hypothesis.

Furthermore, Manage and Marlow (1986) find the presence of bidirectional causality between U.S. federal revenues and expenditures for 1929-82. This bidirectional causality is found in more than half the states. Joulfaian and Mookerjee (1990) also support both tax-and-spend & spend-and-tax hypotheses. Owoye (1995) confirms this result in G7 countries excluding Japan and Italy. Cheng (1999) also identifies this feedback mechanism in Chile, Panama, Brazil, and Peru. This bidirectional causality is also prominent in the case of Indian states, as Bhat, K. Sham *et. al.* (1993) revealed.

II. Methodology and Data

In this paper we use the Granger test of causality (1969) to study the causal relationship between Government Spending and Tax Revenues. It states that a variable *TR* Granger-cause *GE* if the prediction of *GE* is improved solely by the past values of *TR* and not by other series included in the analysis. Vice versa is true for *GE* Granger-causing *TR*. In this connection, it is necessary to estimate these two regressions:

$$GE_t = a_0 + \sum_{i=1}^{n} \alpha_i TR_{t-i} + \sum_{i=1}^{n} \beta_i GE_{t-j} + u_{1t} \qquad (1)$$

$$TR_t = a_1 + \sum_{i=1}^{n} \lambda_i TR_{t-i} + \sum_{i=1}^{n} \delta_i GE_{t-j} + u_{2t} \qquad (2)$$

Where GE is Total Government Expenditures, TR is Tax Revenue and u_1 and u_2 are white-noise residuals. We will test the hypotheses H_o: $\sum\alpha_i = 0$ and H_o: $\sum \delta_i = 0$ respectively for both the equations. If both the hypotheses are subject to rejection, then we can conclude the presence of feedback effect between *GE* and *TR*. And if only one of the hypotheses is subject to rejection, we can construe the unidirectional causality from that variable to the independent variable of the equation. Furthermore, we also anticipate that $\sum\alpha_i<1$, $\sum \beta_i<1$, $\sum\lambda_i<1$ and $\sum \delta_i<1$.

In addition, the Granger Causality test is very sensitive to the selection of lags of independent and dependent variables. Some previous studies like Anderson *et. al.*, (1986); Manage and Marlow (1986); Joulfaian and Mookerjee (1990); Baghestani and McNown (1994) arbitrarily choose the lag lengths. This arbitrary choice can not be justified *a priori* and could

generate biased results. As Lee (1997) points out the practice of choosing similar lag length could be a potential model misspecification. One may argue that the political and economic history of a country would appropriately elucidate at what year one variable is causing the other. However, to keep oneself from model misspecification in a situation where one is not sure as to what lag to use, some alternative measures would have to be acquired. Therefore, a more proper technique of best-lag selection is adopted using the *modus operandi* defined here: In our approach, we use the Akaike Information Criterion (1969) and Schwarz Criterion (1978) to determine the appropriate lag lengths for *GE* and *TR*. Both these tests suggest that a model with the least value of AIC and/or SC should be chosen. This selection process follows this way: first we regress GE on the lags of GE excluding *TR* from where the best lag(s) is determined. Second, using these lags for *GE*, we start including lags of *TR* in the regression so that the suitable lag(s) for TR would be determined. It is the procedure for selecting appropriate lag lengths for both variables in equation (1) and the same methodology is adopted for equation (2). We use Normal, First-differenced and Log series for our analysis and the results of AIC and SC for these three series are reported in Tables 2a, 3a and 4a respectively. First-differenced series is a good instrument to get rid of any nonstationarity problem and Log series is used to minimise the variance. It is also worthwhile notifying that Schwarz Criterion is a better measure of choosing lag lengths since it imposes a harsher penalty of adding more restrictions; {see Gujarati (2003) for details}. In our analysis, both AIC and SC depict the same conclusion for most of the cases. Otherwise we use SC for the reason defined above. Similarly, Tables 2b, 3b and 4b show the results of Granger Test respectively for three series.

We use the data for these two variables in real terms (we use GDP deflator as the general price level) from 1973 to 2003. These are revised estimates taken from various issues of Federal Budgets in the Briefs. Total Government Expenditures constitute Federal Current Expenditures, Provincial Current Expenditures and Annual Development Programme. Similarly, Total Tax Revenue constitutes Federal Direct & Indirect Taxes and Total Provincial Taxes.

III. Empirical Results

Table-1 sums up the results of the Granger test for all three series. It can be seen that we essentially face unidirectional causality running from Government Expenditure to Tax Revenues. Moreover, Tax Revenue responds quickly to the changes in Government Expenditure. This would fundamentally be the case where government expenditures are determined

through political manipulation and then the financial sources are searched to finance these expenditures. In the Pakistani context, Total (federal, provincial combined) Current Expenditures were Rs.700 billion during 2002, rose up to Rs. 792 billion last year showing an increase of 13%. On the other hand, Development Expenditures were Rs.126 billion in 2002, increased up to Rs. 130 billion portraying a jump of only 3%. It clearly shows the government preferences and points out the areas where current expenditures need to be heavily shrunk. These include defense expenditures, debt servicing and general administration. The demand for defense expenditure is quite high for whatever reason. Furthermore, this spending has, explicitly or implicitly, been one of the main preferences for any regime, whether military or democratic. Similarly, spending on general administration is predominantly the expenses on bureaucracy and include extensive compensations which tends to increase the size of the government while it is an empirical fact that little government is always good government. Debt servicing is another major part of our total expenditure outlays. All these expenditures have been priority spending over the years in Pakistan and, despite attempts to be contained now, still compose the major part of total spending. It can be argued that the heavy reliance on these expenditures is not only certainly against pro-Keynesian theory but also imperative to increase the budget deficit.

Table-1: Summary of Results for Granger Causality Test

Normal Series	First-differenced Series	Log Series
TR does Not Cause *GE*	*TR* does Not Cause *GE*	*TR* does Not Cause *GE*
GE cause *TR* at 1st Lag	*GE* cause *TR* at 3rd Lag	*GE* cause *TR* at 1st Lag

Furthermore, it has been argued several times that we have had very compact allocations for development expenditures. In times of political mayhem and military tensions, the axe always hits development outlays to fill the gaps in current expenditures. The main channels to sponsor these expenditures are the introduction of fresh taxes, raising the existing tax rates and borrowings. Governments tended to be involved in these practices without precisely considering the affiliated costs, not by monetary means but by welfare aspects. Secondly, due to the narrow tax base, evasion and inefficient implementation, collection never occurred as expected and needed. Thirdly, as stated herein above, the revenues raised through taxes mostly went to finance consumption expenditures.

Nonetheless, looking at the causality results, we have two simultaneous solutions. First, increasing the tax base and making sure of proper tax collection avoiding misuse and leakages. Second, now that the governments start focusing on these issues, besides finding new sources to finance these expenditures, there is a need for a gradual shifting from excess current expenditures towards development overheads.

Moreover, since in this study *GE* is causing *TR*, it can be claimed that decreasing expenditure can also decrease revenues. Nevertheless, it may be argued that since not all (rather, few) expenditures are investment spending, if we decrease the consumption expenditures together with the increase in revenue collection which can be justified on economic grounds, the result will certainly be against this claim.

The reader may also presume that since in this study *GE* is not found to be dependent on *TR*, only increasing the tax revenues may tend to reduce the budget deficit. This is rather a difficult question to answer as well as a very strong assumption that could not be suggested only considering the causal relationship between these two variables, which is the basic element of this study. What we need is the 'effect' analysis of all the expenditures and revenues separately and in aggregate. Precisely, we need proper cost-benefit analyses of any changes in taxation and expenditures if we are to address the problem of the federal deficit.

IV. Conclusion and Policy Implications

In this study, the causal relationship between Total Expenditures and Tax Revenue has been analysed. In general, our results support the Barro hypothesis that government expenditure causes revenues. The result that *TR* does not cause *GE* can best and only be explained by the political economy of Pakistan where the main expenditures are the outlays chiefly determined politically by bureaucratic and military influence (defense, debt servicing, general administration). Most of these consumption expenditures pose self and/or group interests rather than overall welfare. Although debt servicing is a liability transfer from previous periods, it is included here too because the debts taken have not been reflected in increased development and other investment expenditure over the years and have arguably been used for self interests rather than communal welfare by politicians. For that matter, a major portion of development expenditure in Pakistan is the residual amount left over from different consumption expenditure heads in provincial accounts (Net Capital Receipts, Net Public Account Receipts, for instance). Whenever the political need (or greed) of consumption

expenditure is higher, there is little left as residual to self-finance the development expenditure by provinces.

Furthermore, seeing that our tests can not guarantee the final benchmark resolution of the issue of reducing the deficit, we can obviously not support increasing tax revenues over decreasing expenditure. Only reducing the expenditures can not solely be acclaimed; rather, what we need primarily is (i) reduction in the size of large consumption outlays and their shifting towards development and other investment expenditures, thereby moving towards Pareto optimal solutions. In addition, the presence of and dependence on the political factors in determining the preferences for expenditures can interrupt any economic step taken to correct for the revenue-expenditure gap. Therefore, (ii) in determining the new outlays, economic efficiency should be preferred over political determination.

In addition, as is the focal point of this paper, results suggest that besides the Tax & Tariff Reform programme of the government which emerged and was enhanced during the 90s, ***we strongly need an expenditure reform curriculum*** in which comprehensive cost-benefit analyses should be conducted for government expenditures together with the analyses of adopting optimal approach for gradual shifting and reformation. This whole scenario should be scrutinised in a general equilibrium framework so that the effect and distributional consequences of any expenditure could be spread over the entire economy. Besides considering only the revenue generation from Tax and Tariff reforms, expenditure reforms analysis should be considered as the task that will determine the direction and deployment of revenue raised from Tax and Tariff Reforms. Once the optimal expenditures are identified, it will be 'economically efficient' to set targets for tax collections and revenue utilistion.

APPENDIX:

TABLE – 2a: Tests for Lag Selection using AIC & SC
Normal Series

$$\left(\frac{GE}{P}\right), \left(\frac{TR}{P}\right)$$

Dependent Variable	Lag of GE	Lag of TR	AIC	SC
GE	1	-	11.53	11.63
	2	***-***	*11.47*	***11.61***
	3	-	11.48	11.67
	4	-	11.54	11.78
	2	***1***	*11.52*	***11.71***
	2	2	11.59	11.82
	2	3	11.70	11.99
	2	4	11.67	12.01
TR	***-***	***1***	*9.47*	***9.56***
	-	2	9.43	9.57
	-	3	9.50	9.69
	-	4	9.58	9.82
	1	***1***	*9.36*	***9.50***
	2	1	9.41	9.60
	3	1	9.50	9.74
	4	1	9.58	9.87

Table – 2b: Granger Causality Test Results between Total Expenditures (GE) and Tax Revenues (TR) using Table-2a

Dependent Variable	Lag of GE	Lag of TR	TR ===> GE		GE ===> TR		Final Inference
			F-Stats	Sig. Level	F-Stats	Sig. Level	
GE	2	1	0.53	0.47	-	-	Unidirectional Causality from GE to TR
TR	1	1	-	-	5.27	0.029	

Table – 3a: Tests for Lag Selection using AIC & SC
First Differenced Series

$$\Delta\left(\frac{GE}{P}\right),\ \Delta\left(\frac{TR}{P}\right)$$

Dependent Variable	Lag of GE	Lag of TR	AIC	SC
GE	***1***	**-**	***11.40***	***11.49***
	2	**-**	11.41	11.55
	3	-	11.46	11.66
	4	-	11.41	11.66
	1	***1***	***11.47***	***11.61***
	1	2	11.58	11.77
	1	3	11.53	11.77
	1	4	11.40	11.69
TR	**-**	***1***	9.39	***9.48***
	-	2	9.44	9.58
	-	3	9.51	9.70
	-	4	9.56	9.81
	1	1	9.45	9.59
	2	1	9.50	9.69
	3	***1***	9.32	***9.56***
	4	1	9.36	9.65

Table – 3b: Granger Causality Test Results between Total Expenditures (GE) and Tax Revenues (TR) using Table-3a

Dependent Variable	Lag of GE	Lag of TR	TR ===> GE		GE ===> TR		Final Inference
			F-Stats	Sig. Level	F-Stats	Sig. Level	
GE	1	1	0.00	0.99	-	-	Unidirectional Causality from GEs to TR
TR	3	1	-	-	3.7225	0.024	

Table – 4a: Tests for Lag Selection using AIC & SC
Log Series

$$LOG\left(\frac{GE}{P}\right),\ LOG\left(\frac{TR}{P}\right)$$

Dependent Variable	Lag of GE	Lag of TR	AIC	SC
GE	***1***	**-**	*-2.89*	***-2.79***
	2	**-**	*-2.80*	-2.66
	3	-	*-2.82*	-2.63
	4	-	*-2.77*	-2.53
	1	***1***	*-2.89*	***-2.75***
	1	2	*-2.83*	-2.64
	1	3	*-2.83*	-2.59
	1	4	*-2.75*	-2.46
TR	**-**	***1***	*-3.28*	***-3.18***
	-	2	*-3.21*	-3.07
	-	3	*-3.21*	-3.02
	-	4	*-3.14*	-2.90
	1	***1***	*-3.32*	***-3.18***
	2	1	*-3.24*	-3.05
	3	1	*-3.21*	-2.97
	4	1	*-3.13*	-2.84

Table – 4b: Granger Causality Test Results between Total Expenditures (GE) and Tax Revenues (TR) using Table-4a

Dependent Variable	Lag of GE	Lag of TR	TR ===> GE		GE ===> TR		Final Inference
			F-Stats	Sig. Level	F-Stats	Sig. Level	
GE	1	1	1.998	0.16	-	-	Unidirectional Causality from GEs to TR
TR	1	1	-	-	3.303	0.08	

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