Cointegration Analysis of Indirect Taxes and Fiscal Deficit in Pakistan

Irfan-Ullah¹, Farid Ullah Khan²

Abstract
The paper is analyzing the existence of long run relationship between fiscal deficit and indirect taxes in Pakistan for period 1981 to 2010. We used unit root properties of variables followed by Johansen cointegration and Granger causality techniques for data estimation. The empirical findings show a possible long run relationship between indirect taxes and fiscal deficits. Indeed univariate causality from fiscal deficit towards indirect taxes also implies that fiscal deficit causes indirect taxes to increases. Both indirect taxes and fiscal deficit have severe implication for economic growth, investment, FDI and consumption decision, therefore government should adopt an optimal tax policy acceptable to both consumer and producer. Indeed, government should minimize the budget deficits or alternative switch towards income taxes and increase its share in total revenues.

Keywords: co-integration, fiscal deficits, indirect taxes, Pakistan

1. Introduction

Fiscal mismanagement has remained a common phenomenon in most of developing countries, inadequate financial resources against high governmental expenditures; worsen the balance budget of the economy. Budget deficit mainly emerges when government expenditures exceed its revenues; in such situation a government has three options' viz collection of debt, print new currency or increase the tax revenues to fill the deficit gap. Although there are many sources to finance government expenditure, taxes are however the main sources of financing. Obviously, a monetary solution seems to be ineffective when high rates of inflation and unemployment coexist. (Yasin, 2001). Direct tax in general and indirect tax in particular possess large volume of revenues in developing economies. Though some researchers consider relying on indirect taxes as poor taxation system yet it prevailed in most of the developing countries. Taxes have severe implication for different macroeconomic variables notably poverty, FDI inflow, inflation rate, personal consumption, and investment decisions etc. (Monsingh & Kerr, 2001 and Filho et al. 2010) ). Nevertheless, tax indices have greater importance while imposing a tax, like sales taxes on consumer commodities that are inelastic, will bear a greater loss in consumer surplus than producer surplus and vice versa.

Most of the governments give incentives in order to attract multinational firms and gradual elimination of barriers on capital movements have stimulated governments to compete for FDI in global markets and reinforced the role of tax policy and thus fiscal incentives become a global phenomenon (Morisset and Pirnia, 2000). Since high rate of indirect taxes discourage FDI inflow and therefore most of the governments offer lower corporate taxes. A tax affects the net return on capital and has influenced the capital movement between the countries; therefore, most of early literatures are mainly focused on evaluation of a generous tax policy that could compensate for other obstacles in the business environment and, thus, attract multinational companies. Similarly high personal income tax rates may be reflected at least in part in high pretax wages, which in turn discourage FDI if labor and capital are complementary (Desai and Hines, 2001).

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Indirect taxation is an important determinant of price level for some commodities, products and services, which also affects consumer decision and firm efficiency and output decision. Therefore controlling of indirect taxation by the government is highly desirable, which will, affect output, ultimate prices of products, services and consumers’ decisions (Hussain and Naheed, 2005; Yan et al., 2010). Taxation is generally balance the economy in terms of the redistribution of funds and income from the rich to the poor (Yan et al, 2010). However recent financial and trade liberalization deteriorated internal and external sector of the economy and consequently leads to massive poverty and high unemployment rate. (Anwar 2002).

Taxes in general fiscal deficit in particular deteriorate economic growth and several evidences showed that countries charging low taxes growing faster than high taxed rate countries (Jenkins, 1989 and Marsden, 1990). Further weak institutions, corruption in public investment widen the gap between rich and poor and drag lower class in extreme poverty.

2. Trend and Dynamics of Indirect Taxes and Fiscal Deficit in Pakistan

Pakistan is also facing large fiscal deficits from the last few decades, which, emerges from high governmental spending and low tax rate, misallocation of governmental funds etc. At present level the war against terror and spending on social security is the major factor responsible for enlarging the defense spending in Pakistan⁴. Pakistan is also facing persistent large fiscal deficits from last two decades, after accepting IMF plan in 2008 the volume of indirect taxes have increased and several types of subsidies were eliminated. Indirect taxes can be divided into two sub taxes called General Sales tax (GST) and Federal excise duty (FED), during fiscal year 2011-12 Pakistan’s government is aiming to raise GST and FED more than Rs 140 billion. In 2004 Pakistan’s budget deficit was around 4% of GDP, which reduced to 3.4 in 2005. This further tend to reduce up to 3.2% in 2006, but it get start increasing up to 4.2% in 2007 and it touched at the highest points of 7.3 % in the 2008, but slightly reduced in 2009 to 4.7% of GDP. The gross and net collection of indirect taxes growth has increased 16.9 percent and 13.8 percent, respectively. (PES, 2011)⁴. Similarly a persistent increasing trend has been witnessed in volume of indirect taxes as it increased from Rs.26160 million in 2002 to Rs.100930 million in 2011. Since Pakistan government accumulate a larger portion of its revenues from indirect tax, It has accounted for 62.8 percent of the total tax revenues ( PES, 2011). Fiscal deficit also has dynamics trend; as increasing and decreasing trend has been witnessed in different years. From 1981 to 1988 there was an increasing trend and the growth of fiscal deficit increase from 5 percent to 8.5 percent respectively. After that it decreases in 1989 and 1990 and thereafter it again tends to increase and this increasing trend however continued in different years. The trend of recent decade (2000-10) shows that there was a decreasing tendency of fiscal deficit from 2001 to 2007 and in later years this trend became increasing. The fiscal deficit and indirect taxes has following graphical trend:

Graph -1 Indirect taxes and Fiscal Deficit (% growth)

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³ The defense spending increased by 12 percent (Rs 495 billion) during fiscal year 2011-12
⁴ Pakistan Economic Survey (PEC) 2011
The graphical show trend and dynamics between fiscal deficit and indirect taxes, this graph does not provide a conclusive. Therefore implementation of statistical is highly desirable, which hopefully provide better inferences. The objective of this research paper is to investigate relationship between indirect taxes and fiscal deficits in Pakistan and this would further use for forecasting and policy implication. In fact indirect taxes are the main stream of Pakistan’s revenue therefore it is desirable to test relation between indirect taxes and fiscal deficit. The remaining paper is organized as section-II shows the theoretical framework for indirect taxes and fiscal deficits in Pakistan, section-III and IV hold econometric methodology and empirical findings respectively and the final section is based on conclusion of this study.

3. Econometric Methodology

Since we are interested to know the long run relationship between indirect taxes and fiscal deficits therefore we will use unit root analysis followed by cointegation. Long period data are employed for empirical assessment therefore it is likely to face spurious outcomes which mislead our predications and thus conventional OLS technique fails in this case. In order to avoid stationary problem, unit root test is used, Ducky Fuller (1979) and Augmented Ducky Fuller (1981) are commonly used in literature, which is estimated using tau (τ) statistic or Mackinnon (1999) critical values for hypothesis. Dicky Fuller (DF) technique is based on following three equations for unit analysis;

\[ \Delta Y = \psi Yt-1 + \epsilon t \]  
\[ \Delta Y = \beta_0 + \psi Yt-1 + \epsilon t \]  
\[ \Delta Y = \beta_0 + \beta_1i + \psi Yt-1 + \epsilon t \]

The above mention equations are to test for the parametric value of “ψ”, if “ψ” is zero, the variable is said to be non-stationary alternative non-zero value of ψ will indicate that the variable is stationary. It is assumed that error terms are not correlated in all the of the above equations (1,2,3). If the error term is correlated, Ducky Fuller construct a new equation and call Augmented Ducky Fuller (1981) test, which, consists following estimation

\[ \Delta Yt = \beta_0 + \beta_1i + \psi Yt-1 + \Sigma \beta_i Yt-1 + \epsilon t \]

Now if computed ψ value exceeds from τ statistics or Mackinnon critical one can accept the hypothesis of non-stationary otherwise if τ value lies in critical region the variable consider being stationary. For long run analysis; cointegration are practiced there are two major techniques one is Engel and Granger (1987) approach and other is Johansen’s technique. However Johansen (1991, 1995) technique is preferred to Engel and Granger (1979) approach due to some statistical features notably the identification of number of vector (s), in fact Engel and Granger technique doesn’t provide information about number of cointegrated vectors. Therefore, we are applying for cointegration approach suggested by Johanson (1995) which consist two statistics, one is maximum eigen values value and other is trace statistics. Cointegraion test only provide information of possible long run vectors its does not show the direction therefore one may apply casualty test in order to determine the direction of long run movement (Angela & Lee, 2011; and Afzal, 2007). The standard Granger causality is based on following equations.

\[ \Delta Yt = \alpha_0 + \alpha_1 \Delta Yt-1 + \ldots + \alpha_m \Delta Yt-1 + \alpha_0 \Delta xt-1 + \ldots + \alpha_m \Delta xt-1 + \epsilon t \]
\[ \Delta Yt = \gamma_0 + \gamma_1 \Delta xt + \ldots + \gamma_m \Delta xt-1 + \gamma_0 \Delta Yt-1 + \ldots + \gamma_m \Delta Yt-1 + \epsilon t \]

Granger Casualty test forecast future value on bases of past value. There is possibility of unidirectional, bidirectional and no casualty amongst the included variables. Akike and Shwards techniques are used for lag selection criteria.
4. Empirical Estimation

This section contains the empirical estimation derived from different equations; since we hold long period time series data set, therefore our primary goal is to test unit root properties ADF unit root test is used for this purpose, table -1 show ADF results

<table>
<thead>
<tr>
<th>Table 1: ADF unit root test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
</tr>
<tr>
<td>FD</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Tax</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

*Parenthesis show critical values

ADF unit root test indicates that indirect taxes (Tax) and Fiscal deficit (FD) both are non-stationary at level and became stationary after first difference. Since both variable are integrated at first order and can proceed for cointegration analysis subsequent table indicates cointegration results

<table>
<thead>
<tr>
<th>Table 2: Cointegration LR Test Based on Maximal Eigenvalue of the Stochastic Matrix</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAX               FD</td>
</tr>
<tr>
<td>List of eigenvalues in descending order:</td>
</tr>
<tr>
<td>.40627   .0025963</td>
</tr>
<tr>
<td>Null Alternative Statistic      95% Critical Value 90% Critical Value</td>
</tr>
<tr>
<td>r = 0    r = 1    15.1185          11.0300                        9.2800</td>
</tr>
<tr>
<td>r&lt;= 1    r = 2    .075389          4.1600                        3.0400</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 3: Cointegration LR Test Based on Trace of the Stochastic Matrix</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAX               FD</td>
</tr>
<tr>
<td>List of eigenvalues in descending order:</td>
</tr>
<tr>
<td>.40627   .0025963</td>
</tr>
<tr>
<td>Null Alternative Statistic      95% Critical Value 90% Critical Value</td>
</tr>
<tr>
<td>r = 0    r &gt;= 1   15.1939          12.3600                      10.2500</td>
</tr>
<tr>
<td>r&lt;= 1    r = 2    .075389          4.1600                        3.0400</td>
</tr>
</tbody>
</table>

Cointegration test is estimated in VAR with no intercepts or trends order of VAR = 1, Both maximal eigenvalue and trace statistics show that the existence of one vector, which implies the presence of long run relationship between fiscal deficits and indirect taxes. Since cointegration does not provide interaction between the included variables in the system, therefore standard Granger causality test is applied. Table-4 presents causality results;
Table 4: Pairwise Granger Causality Tests

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>Observations</th>
<th>F-Statistic</th>
<th>Prob*</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAX does not Granger Cause FD</td>
<td>28</td>
<td>0.05594</td>
<td>0.9457</td>
</tr>
<tr>
<td>FD does not Granger Cause TAX</td>
<td></td>
<td>3.02204</td>
<td>0.0683</td>
</tr>
</tbody>
</table>

* Significant at 10 percent level

A Uni-directional causality from fiscal deficit to indirect taxes is founded, which implies that fiscal deficits cause indirect taxes while indirect taxes do not cause fiscal deficits.

5. Conclusion

This study is analyzing the evidence of cointegration between indirect taxes and fiscal imbalances in case of Pakistan. Using time series data from 1981 to 2010 and estimated ADF unit root followed by Johansen cointegration. The empirical findings show the existence of possible log run relationship between indirect taxes and fiscal deficits which imply both are moving in same direction for the long period. Indeed indirect taxes in the major component and most of the fiscal deficits is finance through indirect taxes, which has adverse implication for macroeconomics variables notably investment, private consumption and saving, as it crowding out domestic investment through fund consumption, while indirect taxes reduces marginal propensity of consume of poor. The persisting corruption, weak institutions jointly misallocate government funds and government expenditures partially accumulated by corrupted elements, which consequently leads to inequality. There is need of fiscal reform and government must minimize the current trend of fiscal deficits in order to narrow the role of indirect taxes. Further government should increase the share of direct taxes in total tax revenue and it will reduce the burden on direct tax payer but also helpful to overcome the budget deficit.

References


Hansen, B.E (1990b), Efficient Estimation and testing cointegration vectors in presence of deterministic trend, Mimeo, University of Rochester.


