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Abstract

Tax based fiscal policies have been regarded as less policy tool to overcome the fiscal-deficit in developing countries. Tax revenue may be a possible source to correct the deficit which reduces economic growth and social welfare. The empirical analysis of this study shows that changes in tax rate may have permanent effects on output, but will have only temporary effects on its growth rate in selected Asian Economies. This implies that an increase in the tax rate has permanently reduce the level of output per capita, but have no permanent effect on growth rate. These findings suggest that the relationship between output and the tax rate in these countries is best described by the neo-classical growth model.

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**Keywords:** Neoclassical growth; Endogenous growth; Fiscal policy; Tax smoothing

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I. Introduction:

There has been an extended discussion about the role of fiscal policy about regulating the levels and composition of revenue, expenditure and the public debt with the attention to achieve fiscal tolerance over a period of time. It incorporates numerous basic policy issues including appropriate size of the state, the role of the government in accelerating economic growth, social development and redistribution of the benefits of the economic growth, improving employment and social justice by reducing inequality in income and wealth between income classes and present and future generations, and ensuring efficiency by promoting optimum allocation of resources.

Among the public policy instruments tax rate changes have different implications in neo-classical and endogenous growth models. Most of the exogenous models predict that permanent changes in government policies do not have permanent effect on the per capita growth rate of output. The neo-classical growth models imply that changes in a country’s tax structure should have no impact on its long-run growth rate. Such changes allow a country to move towards a higher or lower level of economic activity, but the new long-run growth path converges to the old long-run path. It is only during the transition from the old path to the new path that the rate of growth of a country’s real output can increase or decrease.

The present study aims to test whether tax policies adopted by selected Asian countries have transitory or permanent impact on their growth. Rest of the paper deals the theoretical and empirical background, estimation and discussion of results.
II. Theoretical and Empirical Background

An important research issue arising from Barro’s (1979) tax-smoothing hypothesis insights is: whether, the tax policies adopted by a government effects its output growth permanently or transitorily? A prominent feature of the endogenous growth theories is---permanent change in a variable that is potentially influenced by government policies cause permanent changes in the growth rate.\footnote{These growth models are fully developed in Romer (1986, 1987, 1990), Lucas (1988), Rebelo (1991), Grossman and Helpman (1991a, 1991b), Jones, Manuelli and Rossi (1993), Aghion and Howitt (1992), Kim (1992), Gomme (1993), and Pecorino (1993, 1994).} The policy effect in the endogenous growth models is contradictory to that of neo-classical growth models (exogenous models).\footnote{Ramsey (1928), Solow (1956), Cass (1965), and Feldstein (1974)} The latter anticipate that such changes will alter growth rate only temporarily. The endogenous growth models argue that financing through taxes may have an impact on welfare and/or on growth. Tax policy can affect economic growth by discouraging new investment and entrepreneurial incentives or by distorting investment decisions since the tax code makes some forms of investment more profitable than others or by discouraging work effort and workers’ acquisition of skills. Most of the empirical literature reveals an inverse relationship between tax burdens and rates of growth i.e. a lower tax burden would raise the rate of economic growth. Therefore, future economic output would be higher with the optimal rate of taxation and hence future tax revenues would be higher with a lower rate of taxation.\footnote{See Scully (2006) for details.}

The endogenous growth models predict that permanent changes in government policies can have permanent effects on the per capita growth rate of output. In neo-classical growth models such policies cannot affect the per capita level of output permanently while in
endogenous growth models they can. Barro’s (1979) tax-smoothing hypothesis says that, if the marginal cost of raising tax revenue is increasing the optimal tax rate is a martingale. This implies that changes in the tax rate will be permanent and, given their different effects on growth, under the two types of growth models, very useful in empirically distinguishing between the exogenous and endogenous models.

One of the fundamental predictions of growth theory, old and new, is that income taxes have a negative effect on the pace of economic growth rate. The endogenous growth models predict that temporary government spending policies have a positive effect on output but a zero effect for permanent spending shocks. Devereux and Love (1995) consider a two-sector endogenous growth model which has been extended to allow for an endogenous consumption leisure decision, to analyze the effects of government spending decision. The findings explore that a permanent increase in the share of government spending in income that is financed with lump-sum taxes will endorse interest and the long-run economic growth rate at the cost of social welfare. The study argues that a permanent increase in government spending reduces the long-run growth rate when it is funded with an income tax or wage income taxes while a temporary rise increases output but has no impact on long-run growth rate. It also claims that government spending may increase growth rates only if it is financed with a tax-smoothing policy. Karras (1999) and Tomljanocich (2004) have tested empirically whether tax policies have transitory or permanent impact on the growth rate of output. However, all these studies deal with only developed economies and almost no work on developing ones. Therefore, this gap in existing literature on fiscal policies and economic growth needs to be filled.

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4 Kocherlakota and Yi (1996)
III. Endogenous versus Exogenous Growth Effect Test:

This section presents a model for testing whether tax policies carried out by developing countries cause endogenous or exogenous growth. Evan (1997) presents a procedure to investigate whether fiscal policies have permanent or transitory impact on economic growth. Using a simple stochastic growth model that nests both endogenous and exogenous growth, he demonstrates that the growth rate should be stationary at level if growth is exogenous and difference stationary if it is endogenous when any policy variable affecting investment is difference stationary. This study uses tax rate as a policy variable, which affects the investment, to check whether the effect of the tax policy is endogenous or exogenous on the growth in selected Asian countries. Unit root test is used to test the difference stationarity of the tax rate and then to verify whether the real per capita GDP growth rate series is stationary at level or difference stationary. When the tax rate series is difference stationary indicating tax-smoothing behavior, for its endogenous effect on growth the per capita real GDP growth rate should be stationary at first difference and in the case of exogenous growth it should be stationary at level.

For robustness of the endogenous versus exogenous growth test the methodology of the Jones (1995), Karras (1999) and Tomljanocich (2004) is used, as an alternative way by estimating a dynamic time-series model to check how the changes in the permanent changes in tax rate affect the growth. A natural procedure for testing the AK models is to test this restriction explicitly, considering the joint time-series behavior of taxes and growth. The restriction from the AK models suggests a dynamic relationship between taxes and growth as the following specification,

\[ W_{t,e} = \eta + A(L)W_{t,e-1} + B(L)\tau_{t,e} + \epsilon_{t,e} \] (1)
Where $W$ is the growth rate of real GDP, $\eta$ is intercept, $A(L)$ and $B(L)$ are $p^{th}$-order polynomials in the lag operator $L$ with roots outside the unit circle, and $t$ index of time. This specification can also be rewritten as,

$$W_{t,c} = \eta + A(L)W_{t,c-1} + B(1)\tau_{t,c} + C(L)\Delta\tau_{t,c-2} + \epsilon_{t,c}$$

Where $B(1)$ is a parameter equal to the sum of the coefficients of the polynomial $B(L)$, and $C(L)$ is a $(p-1)^{th}$-order polynomial whose coefficients are related to those of $B(L)$ according to (3).

$$c_q = -\sum_{j=q+1}^{p} b_j$$

Where, $q = 1, 2, ..., p - 1.$

It follows that estimating $B(1)$ in model (2) can be used to construct a test of the endogenous versus the exogenous growth models. If

I. $B(1) < 0$ implies that the sum of the coefficients in the polynomial $B(1)$ is negative and suggests that a permanent shock in the tax rates will permanently reduce growth as suggested by the endogenous growth theories.

II. $B(1) = 0$ entails that the distortions in the tax rate has no permanent effect on growth, supporting the neo-classical model.

**IV. Discussion of Results:**

This study includes seven Asian countries namely; Pakistan, India, Indonesia, the Philippines, Nepal, Sri Lanka and Thailand. Data are obtained from International Financial Statistics for period 1971-2007. Many tests are available to check for unit root in a panel
however, this study uses Breitung and PP-Fisher unit root tests. The panel unit root test results presented in Table 1 indicate that the tax rate series is difference stationary, consistent with the tax-smoothing theory, while the growth rate of per capita real output is stationary at level. This leads to the conclusion that the tax rate changes have exogenous impact on growth. Therefore, first test indicates that tax policies have transitory impacts on the growth in the Asian developing countries.

### Table 1

**Panel Unit Root Tests**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Test</th>
<th>Unit root test in</th>
<th>Exogenous</th>
<th>Individual intercept</th>
<th>Individual intercept and trend</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>None</td>
<td>Individual intercept</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Tax rate</strong></td>
<td>Breitung t-stat</td>
<td>Level</td>
<td>0.53885 [0.7050]</td>
<td>-0.24412 [0.4036]</td>
<td>-0.06745 [0.4731]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>First difference</td>
<td>-13.1140* [0.0000]</td>
<td>-8.46571* [0.0000]</td>
<td>-8.22628* [0.0000]</td>
</tr>
<tr>
<td></td>
<td>PP-Fisher Chi-square</td>
<td>Level</td>
<td>4.83258 [0.9880]</td>
<td>19.8380 [0.1353]</td>
<td>17.1707 [0.2472]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>First difference</td>
<td>244.988* [0.0000]</td>
<td>174.691* [0.0000]</td>
<td>278.877* [0.0000]</td>
</tr>
<tr>
<td><strong>Real GDP per capita growth rate</strong></td>
<td>Breitung t-stat</td>
<td>Level</td>
<td>-3.25743* [0.0006]</td>
<td>-5.38698* [0.0000]</td>
<td>-4.04391* [0.0000]</td>
</tr>
<tr>
<td></td>
<td>PP-Fisher Chi-square</td>
<td>Level</td>
<td>106.148* [0.0000]</td>
<td>118.461* [0.0000]</td>
<td>148.618* [0.0000]</td>
</tr>
</tbody>
</table>

*Note:* Null for both Breitung and PP-Fisher is unit root in the series. Breitung assumes common root process while PP-Fisher assumes individual root process. The probabilities of the null are given in the brackets. *Indicates that the null is rejected at 5% level.

The panel models allow us to have longitudinal as well as cross-sectional characteristics of the data. To make the analysis robust present study uses different panel versions of Model 2. Different panel versions of the model are presented, estimated and, then results are discussed.

$$W_{t,s} = \eta + v_t + \alpha_s + A(L)_{t,s} \Delta W_{t,s} + B(1)_{t,s} \tau_{t,s} + C(L)_{t,s} \Delta \tau_{t,s} + \epsilon_{t,s}$$  \hspace{1cm} (4)

$W_{t,s}$ is the dependent variable, growth rate of real GDP per capita, and $\tau_{t,s}$ is dependent variable, tax rate. $\epsilon_{t,s}$ are the error terms for $l = 1, 2, 3, \ldots, M$ cross-sectional units observed for
dated periods \( t = 1, 2, 3, \ldots, T \). \( A(L)_{t,t} \) and \( C(L)_{t,t} \) are lagged operator of real per capita GDP growth rate and changes in tax rate. \( B(1)_{t,t} \) is the coefficient of the tax rate. The \( \eta \) parameter represents the overall intercept in the model, where \( \gamma_i \) and \( \delta_i \) represent cross-section or period specific effects.

The panel estimation allows for slope coefficients that are common to all countries and periods, as well coefficients that are either cross-section or period specific. If all slope coefficients are common across cross-section and periods, the equation (4) can be written as:

\[
W_{t,c} = \eta + \gamma_i + \delta_i + A(L)_{i,t} W_{t-c} + B(1)_{i,t} \tau_{t-c} + C(L)_{i} \Delta \tau_{t-c} + \epsilon_{i,c}
\]  

(5)

There are K slope coefficients each corresponding to a regressor.

Countries vary widely in their average tax rates. Clearly, there are also structural differences between countries that are independent of their policies, and this heterogeneity needs to be incorporated in the analysis. The equation (6) relaxes the assumption of common intercept. Incorporating country specific fixed effects is uncomplicated that creates a country specific intercept. When all slope coefficients are cross-section specific then the specification can be written as:

\[
W_{t,c} = \eta + \gamma_i + \delta_i + A(L)_i W_{t-c} + B(1)_i \tau_{t-c} + C(L)_i \Delta \tau_{t-c} + \epsilon_{i,c}
\]  

(6)

There are k numbers of coefficients for each cross-section with a total of \( Mk \) slope coefficients.

Finally, if all the slope coefficients are period specific, we have specification as:

\[
W_{t,c} = \eta + \gamma_i + \delta_i + A(L)_c W_{t-c} + B(1)_c \tau_{t-c} + C(L)_c \Delta \tau_{t-c} + \epsilon_{i,c}
\]  

(7)
The number of total coefficients is $T_k$.

### Table 2

**Panel Estimation**

*Dependent Variable: Real GDP Growth Rate*

<table>
<thead>
<tr>
<th>Variables</th>
<th>Common</th>
<th>Cross-section Specific</th>
<th>Period Specific</th>
<th>Cross-Section and Period Specific</th>
</tr>
</thead>
<tbody>
<tr>
<td>$c$</td>
<td>-0.00129 (0.009776) [-0.13145]</td>
<td>-0.01102 (0.019109) [-0.57668]</td>
<td>-0.0018 (0.009514) [-0.18923]</td>
<td>-0.01611 (0.021117) [-0.7628]</td>
</tr>
<tr>
<td>$\tau$</td>
<td>0.129493 (0.066453) [1.948645]</td>
<td>0.234438 (0.12782) [1.834132]</td>
<td>0.118771 (0.06454) [1.840265]</td>
<td>0.256589 (0.140206) [1.830084]</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.163039</td>
<td>0.218689</td>
<td>0.354328</td>
<td>0.401491</td>
</tr>
<tr>
<td>Adjusted R$^2$</td>
<td>0.12401</td>
<td>0.156017</td>
<td>0.20954</td>
<td>0.23963</td>
</tr>
<tr>
<td>SIC</td>
<td>-3.78979</td>
<td>-3.70155</td>
<td>-3.31642</td>
<td>-3.23523</td>
</tr>
<tr>
<td>DW stat</td>
<td>1.992723</td>
<td>1.991673</td>
<td>2.003224</td>
<td>2.006924</td>
</tr>
</tbody>
</table>

*Note:* The coefficient t values are given in brackets and standard errors are given in parentheses. The lag selection in the model criteria is maximum Adjusted R-square and minimum of AIC & SIC. *Indicates significant at 5% level. ** Indicates significant at 10% level.

Empirical estimates of the models are presented in Table 2. Model 4 assumes slope coefficients are common to all countries and periods. Model 5 presents country specific slope coefficient estimates. Model 6 presents period specific slope coefficients and model 7 displays the empirical estimates assuming both cross-section and period slope coefficients fixed. All the four models present similar results. The value of the constant term is negative and statistically insignificant. $E(1)$ is positive and statistically insignificant at 5% significant level indicating that it is not different from zero. The results designate that, the hypothesis that $E(1) = 0$ cannot be rejected in any of the four specifications. The random effects models were also estimated, not reported here, give similar results that of fixed effects models. The analysis is robust across the four estimated models and across a number of different lag lengths. Therefore, the empirical
analyses show that changes in the tax rate do not permanently alter the real GDP growth rate. This means that the effects of tax rate changes on the growth are transitory. Our results are opposite to the predictions of the endogenous growth theory and argue that fiscal policies in selected Asian countries have not permanently change the output growth.

V. Conclusion:

The analysis shows that the tax policies adopted by the developing countries have no evidence that the taxes permanently affect the growth rate. However, government policies can affect the per capita income in the transition path of to the steady-state growth. This is inconsistent with the endogenous class of growth models. Second, a higher tax rate permanently reduces the level of output but has no permanent effects on the output growth rate. These findings suggest that the relationship between output and the tax rate is best described by the neo-classical growth model.

In the light of the above findings, optimal tax rate should be decided to finance the budget for this purpose government should use debt and tax instruments simultaneously. For example, in response to an unexpected increase in government expenditures or decreases in output the government should analyze how much part of this increase is becoming the permanent part of its expenditure. The permanent part should be financed by imposing taxes and the transitory part should be financed by issuing bonds. However, bond financing should be contingent providing a guard against transitory shocks to the budget and should be retired when good days come in future. In this way the Asian economies can minimizes the tax distortion by spreading required tax increase over several periods.
Bibliography


