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An Empirical Analysis of Tax Rate and Economic Growth Linkages of Pakistan

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ABSTRACT

The present study was designed to analyze the long and short-run relationships between tax rate and economic growth of Pakistan. It examined the dynamic effect of tax rate, capital stock, exports, and health expenditures on real GDP per capita by using Johansen's co-integration approach. The time series data were obtained from various sources ranging from 1975-2009. The results showed a negative effect of tax rate on real per capita GDP, thus adverse impacts on the overall economic growth. Other explanatory variables, however, showed positive effects on real GDP per capita. In order to maintain sustained economic growth, tax authorities needs to embrace substantial changes in tax policy aimed at increasing the buoyancy of the tax system.

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INTRODUCTION

Although Taxation is politically unpopular, yet it is used as a policy instrument to generate revenue for the government. The increased revenue collection allows the government to run its activities, enhance its expenditure on various public work programmes and provide the needed space to initiate new projects for economic development. However, increasing the tax rate alters the relative cost of the goods and services that the individuals consume. This may also distort the behavior of individuals by making some things more expensive than the others, Palacios and Harischandra (2008), Poulson and Kaplan (2008). Similarly, higher taxes may also reduce an investor's willingness to invest by rendering the return on investment to stand low. All this has grave implications for the economy in terms of lower level of output, employment and the overall economic growth rate. This study is carried out to investigate these implications with respect to the economy of Pakistan.

Taxation is a burning issue in Pakistan. Bringing agriculture sector to the income tax net, documentation of the economy through Reformed General Sales Tax (RGST) or Value Added Tax (VAT), falling tax to GDP

ratio, the share of direct and indirect taxes in the total tax revenue are some of the important topic of discussion among academicians, researchers and general public in the country. In Pakistan, the main source of tax is the industrial sector which contributes 63 % in the total tax revenue while services and agriculture sector contributes 26 % and 1 %, respectively, GOP (2010). "The direct taxes account only 3.5 per cent of GDP and 35% of total tax revenue in a tax-to-GDP ratio of 9 %", Kiani (2010). This ratio remained below 10 % in the last two decade and exhibits an inverted U-shape pattern. It shows an improvement in the first half of 1990s and the subsequent fall in 2000s, (Pasha et al., 2001). The presence of such an imbalanced tax structure in Pakistan necessitates an empirical investigation as to what would happen with the economic growth of the country if the tax revenue is increased while maintaining the regressive nature of present tax regime. Our study attempts to answer this question by estimating the short run and long run relationship of tax rate with the economic growth performance of Pakistan. There is substantial body of literature that has analyzed the effects of taxation on economic growth rate. The study by Romer (1990) and Solow (1956) produced

contradictory results. Solow used neoclassical growth model and found tax policy has no long term impact on economic growth rates. Romer, on the other hand, came up with a growth model in which both government spending and tax policies can have long term or permanent growth effects. This was substantiated by the results of Karras (1999) who found that tax rate alter the growth permanently in the endogenous growth model while temporarily in the neoclassical growth model. The empirical analysis by Myles (2000) showed that tax to GDP ratio had risen significantly in all developed countries during last century with the stable growth rates; however this ratio remained lower in case of developing countries. Moreover, response of tax-to-GDP ratio to growth rate is negative for developing countries, Anastassiou and Dritsaki (2005). Similar negative effects of changing tax structure on GDP per capita were found by Johansson et al. (2008) and Poulson and Kaplan (2008).

In case of Pakistan, Pasha et al. (2002) analyzed the factor contributing toward the change in the overall tax-to-GDP ratio. They found that in the second half of the 90's, there were serious problems with the process of progression of tax reforms in the country. Hussain and Naheed (2005) examined the response to the change in the indirect tax structure and found that this reduces the production of industrial sector. From the experiences of the developed countries, Chaudhry (2001) provided an optimal tax theory to devise an appropriate tax policy for the agriculture sector of Pakistan. He also suggested that if local bodies were made responsible for tax collection then the tax buoyancy rates is expected to be high and significant in Pakistan. Further, Rasheed (2006) analyzed the tax buoyancy rate (effectiveness) in Pakistan and found that the tax revenue does not respond to growth in investment, money supply (M1, M2), the rate of inflation and public debt; however, change in tax structure caused the change in GDP.

The economic literature on the linkages of taxation and economic growth rated provides mixed findings. The nature of relationship is mainly dependent on the structure of taxation, economic conditions of the countries, the degree of legitimacy and the responsiveness of state. Since all these factors varies in different countries, it is therefore important to identify this relationship between taxation and economic growth in each individual country's specific framework. Our study is thus significant in the sense that it seeks to provide fresh evidence by analyzing the case of Pakistan.

MATERIALS AND METHODS

In order to investigate the connection between tax rate and economic growth of Pakistan we used time series data for the sample period of 1975-2009. Besides total

annual tax-to-GDP ratio, other explanatory variables like total capital stock, exports, and expenditure on health were used in the analysis because these are very important indicators that influence the economic growth. The model is based on the endogenous growth theory, as developed by Balasubramanyam, et al. (1996) and initiated by Romer (1990), that affirm long term effects of government spending and tax policies on economic growth. The variables used in the model are represented below in the form of equation.

$$GDP = \beta_0 + \beta_1 T + \beta_2 K + \beta_3 EX + \beta_4 H + e \quad (1)$$

Where,

GDP = Real GDP per capita

T = Total tax rate

K = Total capital stock

EX = Exports

H = Health expenditures

e = Error term

β_0 = Intercept

$\beta_1, \beta_2, \beta_3$ and β_4 represent the coefficients of independent variables.

Total tax rate measured as, $T = T / B$ (Pasha *et al.*, 2002)

T = Total tax collected

B = Tax base

All the variables used in the analysis are in real form. Since the relationship between per capita GDP and tax rate is non-linear, to make it linear, we took log on both sides of the model. It can be written as:

$$LGDP = \beta_0 + \beta_1 LT + \beta_2 LK + \beta_3 LEX + \beta_4 LH + e \quad (2)$$

Hussain and Naheed (2005) have used the similar model in their study on one sector economy of Pakistan. Our estimating equation is based on the specification used in the leading papers in the growth literature, Hameed et al. (2008) and Barro (1991). This choice of the variables is also consistent with the choice made by other researchers e.g. Abbas and Peck (2008), Ibrahim (2002). Tax rate has a direct relationship with GDP as analyzed by Diehl (2009) and Anastassiou and Dritsaki (2005). As a priori expectation, it was hypothesized that tax rate has a negative impact on economic growth.

Augmented Dickey-Fuller (ADF) test was carried out to test for the stationarity of the variables. Johansen's full information maximum likelihood (FIML) approach was used to test for co-integration and to estimate long run elasticities. Short run effects were then estimated using error correction model (ECM).

RESULTS AND DISCUSSION

Real GDP per capita (GDP), Tax rate (T), Capital stock (K), Real Exports (EX), Real health expenditures (H), (in logarithm), were tested for unit root, using ADF test both with and without linear trend and results are presented in Table 1.

Table 1: Augmented Dickey-Fuller (ADF) unit root test results

Variable	Level			Difference		
	Non-Trended	Trended	Conclusion	Non-Trended	Trended	Conclusion
LGDP	-1.38	-2.56	I(1)	-6.62	-6.58	I(0)
LT	-0.72	-2.79	I(1)	-6.05	-6.14	I(0)
LK	-2.83	-3.23	I(1)	-7.12	-7.01	I(0)
LEX	-2.20	-1.54	I(1)	-6.00	-6.32	I(0)
LH	-2.12	-2.10	I(1)	-4.95	-5.20	I(0)
Critical Value	-2.97	-3.57		-2.97	-3.57	

All the variables have a unit root in their levels and are stationary in their first differences. Hence null hypothesis for unit root is strongly rejected which implies that they are integrated of order one i.e. I(1).

Johansen's procedure was applied to test co-integration between variables in model. The first step of Johansen's procedure is the selection of the order of Vector Auto Regressive (VAR). Adjusted LR-test on VAR with a maximum of four lags was carried out and results are presented in Table 2. Order of VAR can be selected by using different criterions i.e. SBC, AIC and Adjusted LR test. We used Schwarz Bayesian Criterion (SBC) and selected order one because it has maximum value at order one. Thus we select order of VAR = 1.

Second step in Johansen's procedure is to test for the presence and number of co-integrating vectors among series in the model. For this purpose maximal Eigen value and Trace tests are used. Table 3 shows that both Eigen value and Trace tests do not reject $r \leq 1$ at 5 percent significance level for the first time as we move from top to bottom. Therefore, number of co-integrating vector is one. This further confirms the existence of long run relationship and it also indicates that this is the appropriate model for further analysis. So the normalized estimates for this model represent long run elasticities of the variables. We can write the above results of normalized estimates for the model in the form of an equation below:

$$LGDP = 4.188 - 0.1930 LT + 0.40402 K + 0.2925 LEX + 0.14402 LH$$

Table 4, indicates that tax rate, capital stock, real exports, and health expenditures had a significant effect on real GDP per capita in the long-run. The signs of estimated coefficients are according to a priori expectations. These results suggest that one percent increase in tax rate decreases the GDP per capita by 0.193 percent. It means that high and increasing tax rates reduces economic growth persistently perhaps most importantly tax reduces rates of personal income growth by creating strong disincentives to hard work, savings, investment, and entrepreneurship. This tended to be negatively associated with long-term economic growth and this negative relationship between tax rate and GDP is justified by Palacios and Harischandra (2008), Anastassiou and Dritsaki (2005). This long run

elasticity is an indicative of long run adjustment of tax rate.

Capital stock exhibits a positive impact on real GDP per capita. It showed that 1 percent increase in the level of capital investment increases the GDP per capita by 0.40 percent in the long run. This result is comparable with the study of Hameed et al. (2008) where long run coefficient for capital is 0.34. Similar results were found by Bloom et al., 2004 for USA. This finding suggests that capital investment is complementary for economic growth and should be raised. Exports have a positive sign. The long run export elasticity is 0.29, indicating that one percent increase in the level of exports increases the GDP per capita by 0.29 percent. These results show that exports contributes towards the growth of Pakistan as found by Ibrahim (2002). This result also provides evidence of endogenous growth theories that export is an important determinant of growth and productivity.

In long run the estimated coefficient of health expenditure is 0.144. This indicates that one percent increase in the level of expenditures on health increase the per capita GDP by 0.144 percent. Similar results for at least health were extracted by Abbas and Peck (2008). So in Pakistan the allocation of public expenditures to public health should be raised and monitored for its efficient utilization.

ECM

Results in Table 4 indicate that variables in the short run are in first differenced (stationary) form. The signs in short run estimated coefficients are according to a priori expectations. These results indicate that one percent increase in tax rate decreases the GDP per capita by 0.19 percent in the short run. Tax response is same in short run as in the long run. Capital stock shows a positive sign with coefficient value of 0.35. It shows that 1 percent increase in the level of capital increases the real GDP per capita by 0.35 percent. The results of Appleton and Teal (1998) support the findings of our study in short run. Our results indicate that real GDP per capita is not only dependent on current value of capital stock but also related to its previous year's value with elasticity of 0.27.

In short run the export elasticity is 0.107. It shows that one percent increase in the level of exports leads to 0.107 percent increase in the real GDP per capita. The

Table 2: Selecting the order of VAR for the model

List of variables included in the unrestricted VAR:				
LGDP	LT	LK	LEX	LH
Order	AIC	SBC	Adjusted LR test	
4	179.3287	107.6293	-----	
3	182.4429	128.6684	15.5318[.928]	
2	177.8854	142.0357	36.5081[.923]	
1	183.1842	165.2594	50.4896[.987]	
0	-64.0494	-64.0494	243.6877[.000]	

AIC=Akaike Information Criterion; SBC=Schwarz Bayesian Criterion; p-values at 95% significance are in parenthesis.

Table 3: Co-integration LR test based on maximal eigen value and trace test

List of variables included in the co-integrating vector				
LGDP	LT	LK	LEX	LH
Null	Alternative	Statistic	95% Critical Value	90% Critical Value
Maximal Eigen value Test				
r = 0	r = 1	37.6258	34.4000	31.7300
r ≤ 1	r = 2	24.8853	28.2700	25.8000
r ≤ 2	r = 3	15.0718	22.0400	19.8600
r ≤ 3	r = 4	9.0837	15.8700	13.8100
r ≤ 4	r = 5	5.4882	9.1600	7.5300
Trace Test				
r = 0	r ≥ 1	92.1547	75.9800	71.8100
r ≤ 1	r ≥ 2	53.2905	53.4800	49.9500
r ≤ 2	r ≥ 3	29.6437	34.8700	31.9300
r ≤ 3	r ≥ 4	14.5719	20.1800	17.8800
r ≤ 4	r ≥ 5	5.4882	9.1600	7.5300

Table 4: The Long-Run & Error Correction Model Estimates

Regressors	Short-Run	Long-Run
Intercept	-0.025464(-1.4535)***	4.188(5.97)*
LT	-0.046356(-0.348)	-0.1930(-1.727)**
LT(-4)	-0.19131(-1.87)**	-
LK	0.35406(2.7264)*	0.404(2.5)*
LK(-1)	0.27225(1.9391)**	-
LEX	0.032156(0.306)	0.2925(4.14)*
LEX(-1)	0.10739(1.61)**	-
LH(-1)	-0.043589(-0.5859)	0.144(1.672)**
LGDP(-1)	0.36804(1.82)**	-
Ecm(-1)	-0.65643(-3.778)*	-
Diagnostic Tests		
R-squared	0.58	
DW-statistics	1.78	
LM-test- χ^2 (1)	1.3827[.240]	
RESET test- χ^2 (1)	0.15122[.697]	
Jarque-Bera	1.4926[.474]	
Normality- χ^2 (2)		

Values in square brackets are t-ratios; while in parenthesis are p-values; *, **, *** shows significance at 1%; 5% and 10% levels.

estimated coefficient value of health expenditure is 0.04 and statistically is non-significant. This result is contrary to the findings of Bloom et al. (2004) for short run. Further, results shows that current value of real GDP per capita is also influenced by its previous years value with short-run elasticity of 0.36.

The coefficient of error correction term has expected negative sign. It measures speed of adjustment towards long-run equilibrium. The coefficient of -0.65 indicates that about 65 percent of deviation of GDP per capita from long-run equilibrium is corrected in the current period. The LM- test for up to one order indicates no serial correlation problem in the residuals. The p-value for RESET test for functional form misspecification and Jarque-Bera test for normality are greater than 0.05. This means that functional form is correct and the residuals are normally distributed.

Conclusions

We first estimated the co-integration equations after making the data stationary for our model and found that there is a long run negative relationship between tax rate and real GDP per capita. We found significant positive impact of capital stock, exports, and health expenditures on real per capita GDP in long -and short run. In order to ensure a healthy long-run economic development, Pakistan needs to embrace substantial changes in tax policy aimed at increasing the buoyancy of the tax system, increasing the tax-to-GDP ratio by increasing the tax base, increase the number of tax payers, efficient collection of tax amount, reducing distortions and phasing out exemptions, reducing the compliance costs and government's administrative cost.

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