Tax Efficiency Analysis for Pakistan Tax Structure: Comparison of two Decades.

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By
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Abstract

The tax efficiency in Pakistani tax system remained focal point for the last 25 years. However, despite all efforts the tax to GDP ratio remained constant during this period. This period is very active political period for Pakistan, which had strong impacts on the economy of Pakistan. For example the 1980s was peak period of war in Afghanistan against USSR and Pakistan was a front state. Due to this critical position the government of Pakistan received huge aid, which had very, adverse affected the tax efforts of Pakistan government during this period. This was a military rule and to avoid any wrath from public the government avoided any new taxation and these huge inflows provided well-justified ground for it.

After the end of Afghanistan war and the cold war the huge inflows of foreign aids and soft loans ended. This situation got worse when the government of Pakistan had to start repayment and interest payment on loans taken during the 1980s. The era of 1990s was also full of events like drastic reduction in custom duties because of WTO regime, drastic increases in sales tax and income tax due to IMF conditionalities and due to recession in the economy, the tax to GDP ratio remained constant. However during this period pressure were on the tax authorities to increase tax revenue through improved efficiency. Therefore the purpose of this paper is to check the efficiency of tax system during these two periods. This purpose is tried to achieve through two steps regression analysis. In the first step each taxes are regressed on several tax capacity variables like GDP growth, inflation and tax reforms. Where as in second step the residual from the first step are regressed against time. The results shows that in case of sales tax, income tax and total tax in the decade of 1980s when the GDP growth and inflation were high and consequently the natural growth in tax collection were high. This was the period when there was no pressure from IMF and World Bank to keep budget deficit low, so the tax efforts for add ional tax collection was meager and tax efficiency was low. In the second decade 1990s when the GDP growth and inflation were low and so the natural growth in tax collection. However, in this period after the cold war the pressure from IMF and World Bank were very high to keep budget deficit low. Therefore the tax authorities in Pakistan put add ional efforts to increase revenue, which increased tax efficiency..

Introduction:

Pakistan is scarce resource country and very low tax to GDP ratios were (less than 12) compared to other comparable developing countries. The tax to GDP ratio remains stagnant since 1980 around 12%. It is interesting to observe that the tax to GDP ratio is stagnant despite of large variation in GDP growth from 6.75% in 1980s to 3.41% in mid 1990s. Similarly large variations in inflation rate

also do not affected tax to GDP ratio. Such trends continued for the last twenty years despite very large variation in taxable capacity, which warranted a study to look into the factors that are responsible for this stagnancy. One possible way to explain the stagnancy in the tax to GDP ratio is the counter cyclical efficiencies in the tax system, which was result of strict targets set by the government of Pakistan in such situation.

The paper is organized as follow. Section 1 gives the introduction, section II, describe the methodology section III discuss the results and section IV given conclusion and policy implication.

II : Methodology

In section I, we had mentioned that tax efficiency as one of the most plausible reason for stagnancy in the tax to GDP ratio. Our objective in this paper is to estimate tax efficiency using the data from Pakistan economy for the last 30 years. In this paper we try to estimate the tax efficiency of total taxes and individual taxes like sales tax, excide duty and income tax. The methodology to estimate total and individual taxes is same.

According to this methodology we are trying to identify to tax capacity factors such as respective tax base, inflation, per capital income and any major and permanent tax reforms. These are the factors, which directly affect the tax collection of each tax. The simple regression analysis is carried out where total tax revenue and individual taxes are dependent variables and respective bases, inflation, population, tax reforms and set of dummies is the menu of independent variable. This set of equations will tell us how the tax revenues are related to capacity factors. Since we are interested in estimating the tax efficiency and this will appropriately measured once we filtered out the effects of the activity variables. Once these factors are filtered out, the residual from these equations will be regressed against time to see the tax efficiency.

Equation I

$$Tax_i = \beta_0 + \beta_1 * \left(\frac{Tax}{Base}\right)_i + \beta_2 * (Population)_i + \beta_3 * (Inflation)_i + \beta_4 * (Dummy)_i + \varepsilon_i$$

Equation II

$$\varepsilon_i = \alpha_0 + \alpha_1 * (Time)_i + \alpha_2 * (Time)_i^2 + \alpha_3 * (Time)_i^3 + \mu_i$$

Table 1

Unit Root Test				
	Augmented Dickey-Fuller		P-P	
	Intercept	Intercept & Trend	Intercept	Intercept & Trend
Total Tax Revenue	2.708	-0.350	3.945	0.293
Base of Total Tax Revenue	2.232	-3.158	2.956	-3.353
Inflation	**-3.963**	**-3.734**	**-3.659**	**-3.512**
Population	4.992	1.491	8.537	1.757
Unemployment	-1.423	-2.336	-0.843	-1.784
Working Population	-1.385	-1.407	-1.354	-1.413
Residual of Intermediate Regression	-2.202	-2.011	**-2.881**	-2.753
Residual of Final Regression	**-2.706**	-2.615	**-3.421**	**-3.331**
Direct Tax Revenue	1.451	-0.524	2.702	-0.409
Base of Direct Tax Revenue	1.708	-2.144	2.350	-2.428
Residual of Intermediate Regression	**-2.935**	**-2.914**	**-3.404**	**-3.355**
Residual of Final Regression	**-3.264**	**-3.195**	**-3.622**	**-3.702**
Import Duty	-0.902	-1.548	-0.905	-1.752
Base of Import Duty	-1.040	**-3.353**	-2.736	-0.920
Residual of Intermediate Regression	-2.068	-1.827	**-4.444**	**-4.336**
Residual of Final Regression	**-3.693**	**-3.659**	**-6.431**	**-6.338**
Sales Tax	2.006	0.745	6.691	2.965
Base of Sales Tax	3.068	-0.417	5.229	0.047
Residual of Intermediate Regression	**-2.631**	-2.538	**-3.471**	**-3.402**
Residual of Final Regression	**-2.944**	-2.896	**-3.821**	**-3.759**
Excise Duty	-1.308	-2.977	-0.823	-1.812
Base of Excise Duty	1.001	-2.665	1.498	**-3.223**
Residual of Intermediate Regression	-1.868	-1.577	**-3.931**	**-3.737**
Residual of Final Regression	-2.099	-2.020	**-4.269**	**-4.166**

Table 2

Year	Budget Deficit to GDP ratio	Inflation	GDP Growth	Growth in Tax Revenue	Growth in Non-Tax Revenue	Growth in Total Expenditure	Growth in Gross Revenue Receipts	Growth in Direct Tax	Growth in Excise duty	Growth in Sales Tax	Growth in Custom Duty
1980-84	5.77	9.12	6.75	19.90	18.48	15.17	19.48	24.55	19.67	18.04	17.07
1985-89	7.32	6.11	6.40	13.72	17.50	15.34	14.56	8.22	4.59	29.93	14.96
1990-94	6.52	10.19	4.57	14.47	17.74	12.76	15.32	27.71	12.69	18.90	9.61
1995-99	4.88	9.78	3.41	12.92	9.26	10.58	11.57	19.09	11.78	18.63	-1.07
2000-03	5.67	4.13	3.87	8.47	11.19	9.16	8.80	7.09	-6.88	30.12	5.35

Table 3

Explanatory Variables	**Dependent Variable**									
	Total Taxes		Direct Taxes		Import Duty		Excise Duty		Sales Tax	
	Level	Log	Level	**Log**	**Level**	Log	Level	**Log**	Level	**Log**
Constant	-658443**	18.37*	-599586*	-21.87*	-85371*	-18.23*	-3119	-5.88*	-13876	-3.15*
Respective Tax Base					0.676*	1.09*	0.394*	1.44*		
Respective Tax Base/population	97.20*	-32.04*	40.83*	4.927*					7.96*	1.56*
Population					583.7**	3.53*				
Inflation	261391.7***	1.13*	92271	0.3860	119511.5*	0.4974	-14263	-2.496**	68021	1.913***
(Respective Tax Base/population)*Dummy	25.83*	0.0022	16.62*	0.114*					16.99*	0.14*
(Respective Tax Base)*Dummy					-0.157***	-0.092*	0.0350	-0.0147		
(Inflation)*Dummy	-760886*	-0.2681			191720**	7.13*	164431*	6.134*	-833563*	-9.49*
Labor Force/Population	1.257**	*-0.2165*	*1666773**	*6.597**						
R2	0.9653	0.9956	0.9333	0.9812	0.9449	0.9759	0.9040	0.9522	0.9154	0.9869
D-W	1.1384	1.6139	1.0110	1.0715	1.6715	1.6185	1.3540	1.3555	1.3280	1.2341

*, **, and *** significant at 1%, 5%, and 10% level respectively

Tax base chosen for total taxes is the GDP.

Tax base chosen for direct taxes is the non-agricultural GDP.

The tax base of excise duty consists of value added in large scale manufacturing, value added in banking and insurance, and transport and communications.

The chosen tax base for import duty is dutiable imports, that is, total value of imports minus imports of items which are exempt from import duty like food, fertilizer and pharmaceuticals.

The tax base initially chosen for the sales tax is the value of dutiable imports plus revenue from import duty plus value added by large -scale manufacturing. In recent years there has been a major broad-basing of the sales tax and it has increasingly substituted for customs and excise duty and the petroleum development surcharge. The size of the tax base has been extended accordingly to reflect this reform.

Dummy = 1 from 1995 to 2003
otherwise=0

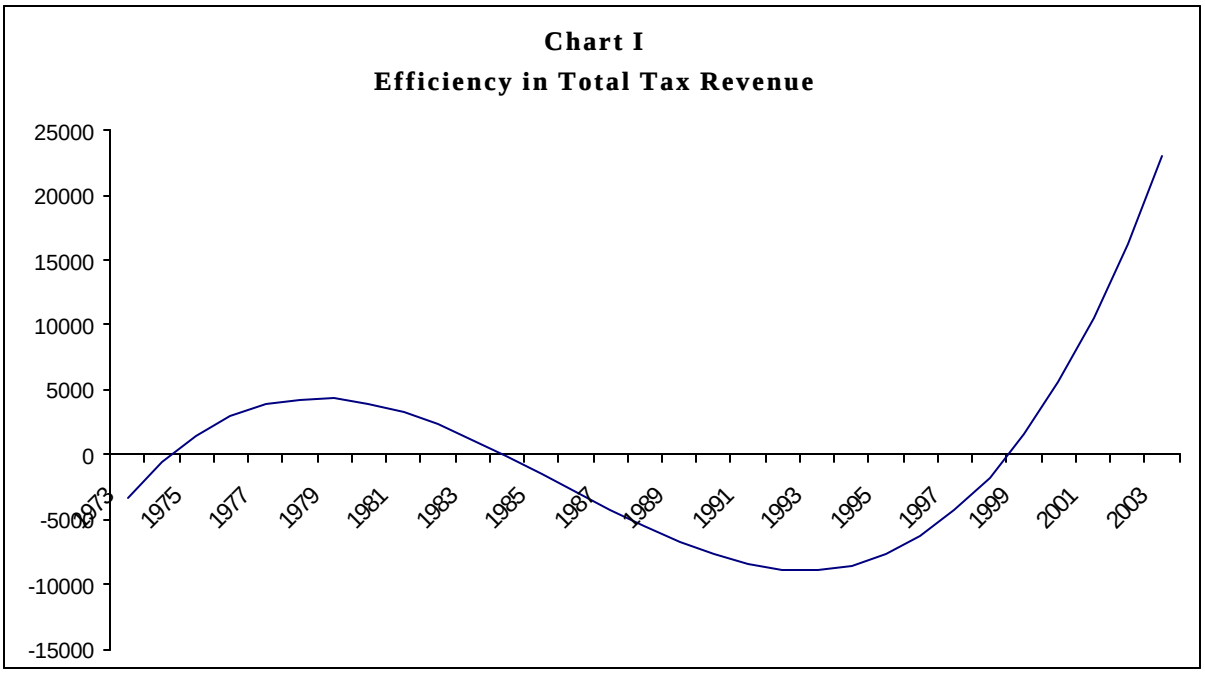


Chart I
Efficiency in Total Tax Revenue
25000
20000
15000
10000
5000
0
-5000
-10000
-15000
1973
1975
1977
1979
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001
2003

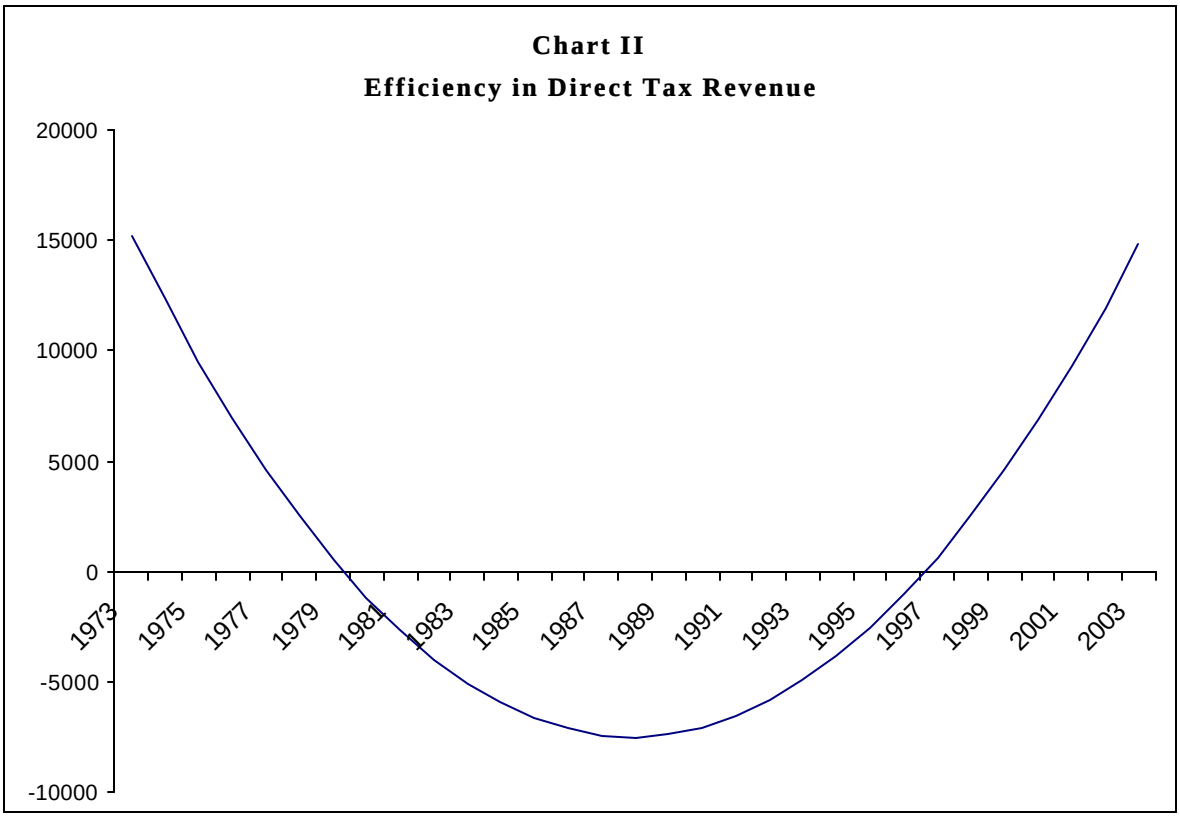


Chart II
Efficiency in Direct Tax Revenue
20000
15000
10000
5000
0
-5000
-10000
1973
1975
1977
1979
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001
2003

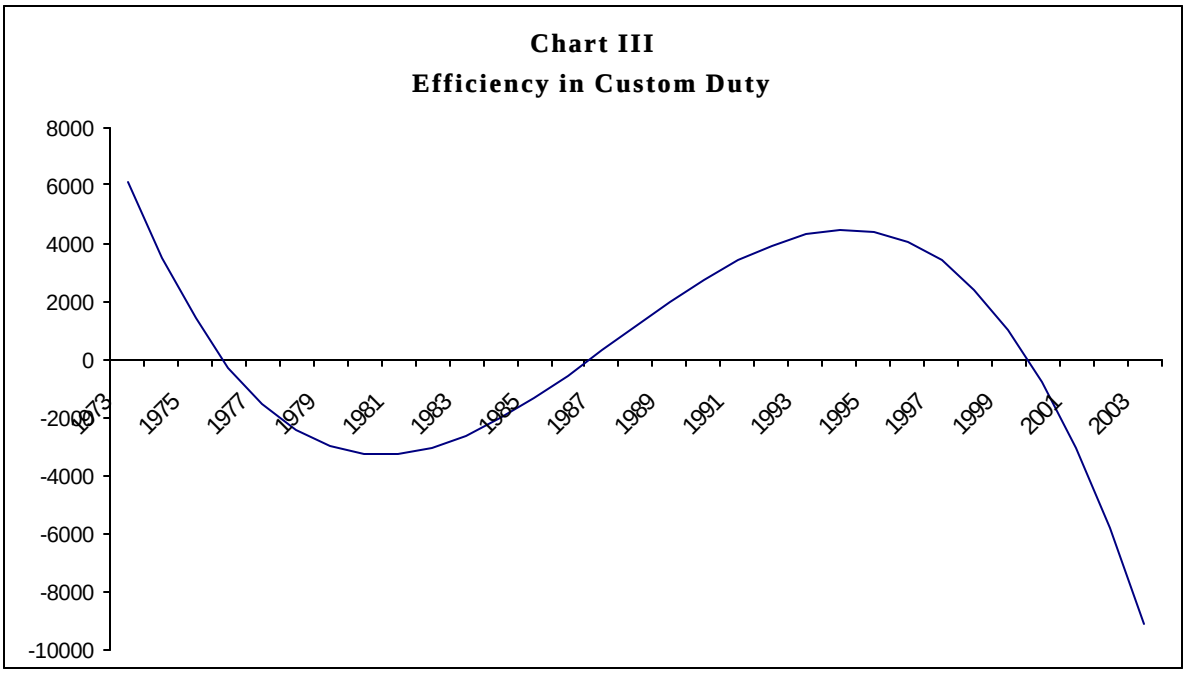


Chart III
Efficiency in Custom Duty
8000
6000
4000
2000
0
-2000
-4000
-6000
-8000
-10000
1973
1975
1977
1979
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001
2003

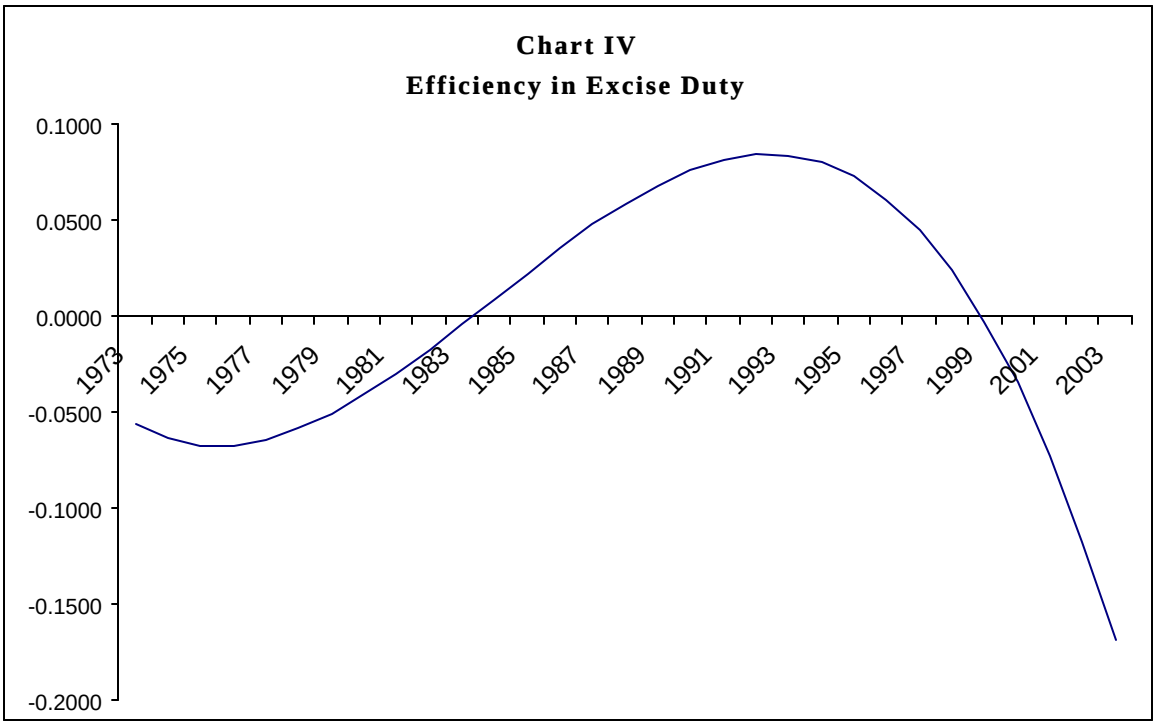
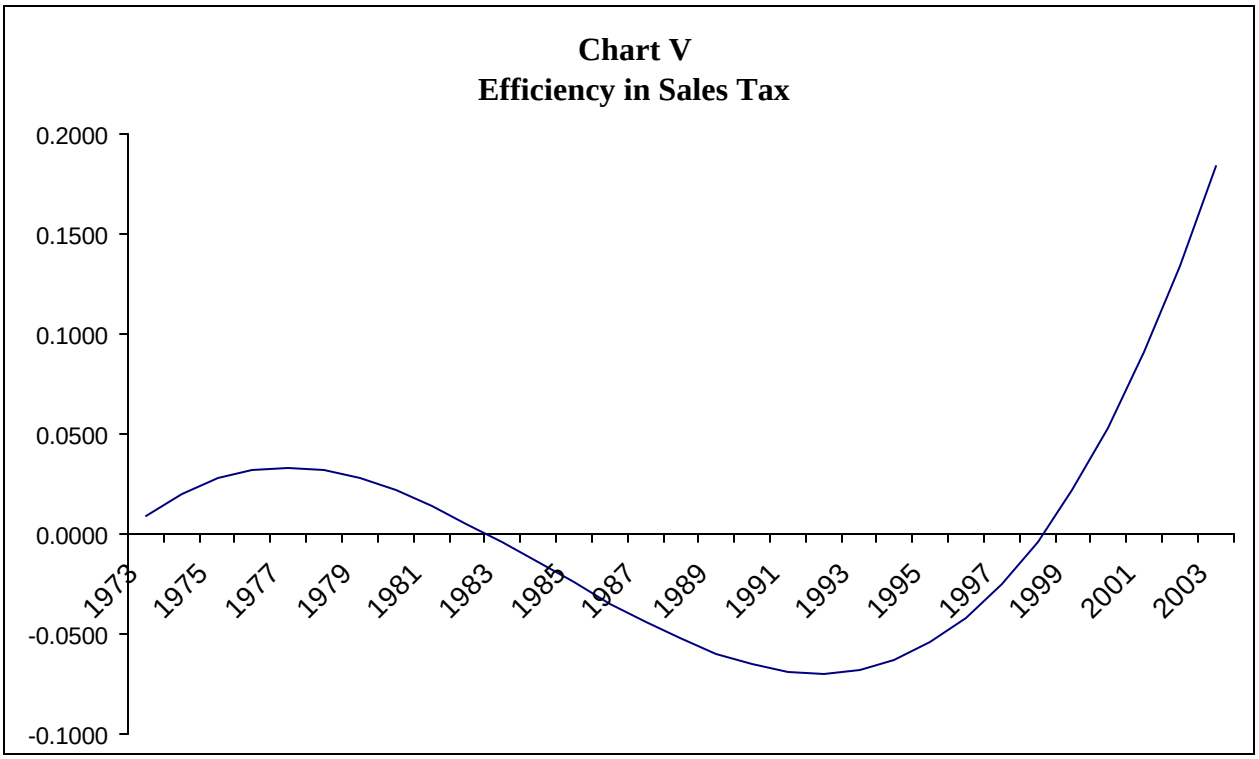


Chart IV
Efficiency in Excise Duty
0.1000
0.0500
0.0000
-0.0500
-0.1000
-0.1500
-0.2000
1973
1975
1977
1979
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001
2003



III: Results and Interpretation

The results of the equation I for each tax are given in table 2. The results for each equation are given both in log and non-log form but for result interpretation better equation is chosen.

Total Taxes

The best result for direct tax is derived in non-log form and given in table 2. The exogenous variables are per capita GDP, inflation and interactive dummy of with tax base on interactive dummy with inflation. All variables are significant and have correct signs. The R^2 is .9653 and D.W. is 1.13 which shows all results are fulfill the requirement of econometric test. The unit root test are also given in table 1. Some variables were not

stationary at level but residual from the equation is stationary at level, therefore we will interpret OLS results.

Then in second step the residual for equation I is regressed against Time and Time Square. The equation also fulfills all econometrics results. The results shown that the pattern of tax efficiency is U shaped. This means that during eighties the tax efficiency for total tax had decreasing trend and in 1990's it was increasing trend.

In the two decades of 1980 the average growth rate of the GDP was 6.75% and 6.4% and inflation rate were 9.12% and 6.11% and budget deficient were 5.77% and 7.32 of GDP. This was the period of high economic growth and high inflation rate therefore; natural growth in tax revenue was also high. During the same period because of the cold was and U.S.S.R invasion in Afghanistan, the Pakistan government being a front line state and ally of U.S.A. received very friendly behavior from IMF and other international leading agencies. During this period there was no pressure from these agencies and therefore the relevant government officials did not make attempt to increase the tax efficiency and resultantly the tax efficiency was very low.

The second period especially after 1995, when the growth rate was very low, and inflation rate was very low and so the taxable capacity, However, after the cold was over Pakistan's political importance was relatively low and after nuclear blast in 1998 the pressure from IMF and other lending agencies were very strong and put several conditionalties including low budge deficit. To meet such conditionalities the government of Pakistan generally and tax authorities especially put all their efforts to increase tax revenues. Despite very low growth in GDP and inflation, a low target of budget deficit was achieved with better management.

Since this is total tax. Efficiency is a summation of efficiency of individual taxes direct tax (income tax), sales tax, excide duty and import due. So we will examine the efficiency in each case separately.

Direct tax:

In table II, the equation gives the result of direct tax. In this case non-log form results are discussed. The exogenous variables are per capital income, labour fore participate rate, inflation and dummy for withholding taxes. The R^2 is .93 and D.W. is 1.01. This equation passes other econometric criteria as well.

This equation shows that as hypothesited the per capita income, Dummy for with holding tax (Value=1 after 1995) and labour force participation rate were with positive sings were significant. Whereas the sign of inflation was positive, as expected but remain insignificant. In second step we factor out all these variables and resulting residual are regressed time and is square, we get graph showing U shaped for last two decades.

This shows before 1990 the tax efficiency was consistently decreasing and then it start increasing and since then it show positive trend. The analysis of tax efficiency reveals interesting results. The decade of 1980 and first two year of 1990's, when the growth of real GDP was very high, and inflation rate was also reasonable. The tax efficiency was very low, this was the period when there was no explicit pressure on targeted budgeted deficit . Due to the very reason the tax officials were relying on natural growth in tax revenue i.e. tax revenues that were results of increase in income and inflation. The governments tax officials during this period were not compelled to introduce efficiency in the tax system. This period, which was good in terms of growth, was barren in term of efforts to increase efficiency in the income tax of Pakistan

The Second period after two three years of 1990 start shows entirely different picture. This was the start of severe recessive, which prevailed whole second part 1990s and early year of 2000's. During this period the growth rate was very low, so as the inflation rate. Therefore the natural growth in tax revenue was low. However, during this period the government introduced withholding income tax, this tax is imposed on imports, capital income, salaries income and contract income. This increases sharply the tax revenue from income tax. This was the period after the cold war when aid and loan flows from American and their allies were stopped and IMF and World Bank started pressurizing the

government of Pakistan to reduce budget deficit. At the same time government was to repay the loan already taken. Pakistan government got more loans from other countries and other intuitions to repay the loan. In this process the interest cost on loan increase from 2.5% of GDP to 7.5% of GDP in 1998-99. This along with the very tough target on budget pressurizes the GOP to increase tax revenue beyond natural growth. This increase the efficiency in the tax system.

Import Duties:-

Import duties used to be one of the most important tax for the government of Pakistan in 70s and 80s. After mid nineties it is a dying tax. In the equitation for import duties tax base, inflation, and two interactive dummies have expected sign and significant. The coefficient of tax base, inflation and interactive dummy are positive showing the quantity and price effects. Another variable which is interactive dummy for respective base and dummy shows negative sign which shows after 1994 the tariff reforms had negative impact on revenue collection from import duties. The R^2 of the equation is 94 and D.W. is 1.67. The graph of technical efficiency shows that in the decade of 80s the efficiency was at increasing and in the decade of 1990s especially in the later part it declined very sharply.

The growth rate of import duty was 17.07% in 1980-84, 14.96% in 1985-89 and 9.61% in 1990-94. This declined to –1.07% in 1995-99 and 5.35% in 2000-03. The technical efficiency of import duties as it appear directly related to tariff reforms in Pakistan.

In 1980s when growth rate of domestic economy was growing at very high rate inflation rate was also high both led to higher value of import and subsequently import duties. This point of time there was no pressure on to maintain low budget deficit and easiest way to collect tax was import duty. Government of Pakistan heavily relied upon this tax during the 1980s and set high target for the custom offices. This increases the tax efficiency of import duties during 1980's and early part of 1990s.

In later of 1990s when the tariff reforms process was initiated and government of Pakistan committed to brought down the tariff rate very drastically. This was the period of low growth of GDP and low inflation. Due to these factors the growth in tax revenue from import duties were very low and for some period negative. Since such changes were the result of WTO and IMF agreement so the government recognizes this situation and shifted its emphasis on sales tax and income tax and therefore not only the natural growth but also the technical efficiency was also declined in import duty.

Sales Tax:

In the sales tax equation the tax base per capita, inflation, interactive dummy with tax base are significant variables with expected positives sings. The interactive dummy with inflation show negative sign because during the low inflation government heavily relied on sales tax shown by average annual increase in tax by 22%. Because of this reason the sales tax and interactive dummy with inflation have negative relationship.

The sales tax is the most important tax in the new tax system of Pakistan. This tax show high growth in all sub-periods in two decades as given in Table II. However, in the decade of 1980s it constituted less than 15% in total tax which now increases to more than 40%. This shows that despite very high tax base the growth rate was still the highest in the latest part of 1990s. This needs to be reemphasized that this was the period of low economic growth and low inflation.

Conclusions

This study uses the data from Pakistan economy fom 1973 to 2003 and shows that tax efficiency in Pakistani tax system remained focal point for the last 25 years. However, despite all efforts the tax to GDP ratio remained constant during this period. This period is very active political period for Pakistan, which had strong impacts on the economy of Pakistan. For example the 1980s was peak period of war in Afghanistan against USSR and Pakistan was a front state. Due to this critical position the government of Pakistan received huge aid, which had very, adverse affected the tax efforts of Pakistan

government during this period. This was a military rule and to avoid any wrath from public the government avoided any new taxation and these huge inflows provided well-justified ground for it.

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References