

Income Tax Revenue as an Indicator of Regional Development in Pakistan

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Abstract

The objective of this paper is to highlight the use of income tax revenue as an indicator of regional development in Pakistan. Initially, we identify a dramatic shift in income tax revenue trends at the provincial level for the period 1992/93 to 2005/06. We develop a simple model of income tax revenue and estimate the relationship between growth of income tax revenue and gross regional product (GRP). Based on the estimated relationship, Punjab appears to have been the fastest growing province during the 1990s, while Sindh shows the greatest level of dynamism in the current decade. This is attributed to high growth rates, especially in large-scale manufacturing during the period, which has a larger sectoral share in Sindh's economy.

Keywords: Income tax, development, revenue.

JEL Classification: H20, R11.

I. Introduction

Subnational planning at the provincial or district level is difficult in Pakistan, given the absence of regionally disintegrated information on the size, composition, and growth of the economy. This is in contrast to other countries like India where estimates of the gross regional product (GRP) are made annually, helping to identify the extent of regional disparities and states that need more support in the federal structure.

It may be time for the Federal Bureau of Statistics to finalize a methodology for estimating annually the GRP of Pakistan's four provinces, and orient its primary data collection efforts toward enabling disaggregation.

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The provincial bureaus of statistics also have a major role to play in this regard.

The first serious attempt to estimate GRP was made by Bengali and Sadaqat (2006). A time series of value added by each sector of individual provinces was derived for the period 1973/74 to 1999/2000. More recently, the World Bank has put forth estimates of Punjab's GRP for the period 1991/92 to 2001/02. However, no GRP estimates are available for the four provincial economies after 1999/2000.

The paucity of data on regional growth patterns has necessitated the search for proxy indicators, which are available on a regular basis and can be updated without needing to invest substantial resources in primary data collection. The caveat is, of course, that such proxies or indicators can only give approximate trends at the regional level.

This paper is organized as follows: Section II reviews the literature. Section III presents the methodology used to aggregate revenue from individual tax collection points to arrive at provincial totals. It also highlights the derived tax share of each province and patterns of growth for regional income tax revenues in Pakistan. Section IV develops a simple model of tax revenue and indicates how the relationship between tax revenue and the tax base can be quantitatively estimated. Section V indicates how the growth rate of a provincial nonagricultural economy can be derived from the growth rate of income tax revenue. Section VI presents the estimates of provincial growth for recent years and then determines whether they are consistent with other evidence available. Section VII concludes the paper and provides policy recommendations.

II. Literature Review

The objective of this paper is to highlight the use of income tax revenue as an indicator of regional development. Bauls, et al (2000) and Varts (2006) demonstrate how personal tax revenue can be used to gauge economic trends at the regional level. Krūzmētra (2006) and Svarinska (2004) use the tax and nontax revenues of municipalities as an indicator of regional development. Paiders (2008) points out that personal income tax revenue fails to capture the informal economy. However, we have chosen income tax revenue as an indicator because it spans a comprehensive tax base, the nonagricultural economy. Moreover, the Federal Board of Revenue (FBR) maintains information on revenues collected at every tax collection point, thereby enabling us to estimate revenues from each province.

III. Estimation of and Trends in Income Tax Revenue by Province

Data on income tax collection by individual regional tax offices/commissions and by medium/large taxpayer units is available in the FBR's database, which is maintained by the department for Fiscal Research and Statistics (FRS). These jurisdictions generally overlap with administrative boundaries at the division/district level. Previously, it was not possible to disaggregate tax collection data in Balochistan. This has become possible since the establishment of a regional tax office in Quetta.

The categorization of tax collection points by province is given in the Appendix. Aggregating collection by the respective units in each province yields estimates of provincial income tax revenue. This dataset is unique as there are no other economic variables for which data is available at a regionally disaggregated level in Pakistan. This is our main reason for using trends in income tax revenue as an indicator of regional development.

Table-1: Income Tax Revenue¹ by Province

Province	Level (Rs Million)		
	1992/93	1999/2000	2006/07
Sindh	27,525	54,208	148,752
Punjab	12,920	46,291	155,575
NWFP	1,022	4,838	4,881.69
Balochistan ²	-	-	2,568.84
Pakistan	41,467	105,337	311,777

Source: FBR/CBR Year Books (various issues).

Table-1 gives estimates of income tax revenue by province for the period 1992/93 to 2006/07 (the FBR has not published the latest figures for 2007/08). Table-2 shows percentage income tax shares by province, indicating dramatic shifts for this period.

¹ At current prices.

² Information on income tax revenue is not available for any period prior to 2003/04.

Table-2: Provincial Shares in Income Tax Revenue

Province	Share (%)		
	1992/93	1999/2000	2006/07
Sindh	68.4	51.5	47.7
Punjab	29.0	43.9	49.9
NWFP	2.7	4.6	1.6
Balochistan	-	-	0.8
Pakistan	100.0	100.0	100.0

Source: FBR/CBR Year Books (various issues).

We note a significant increase in Punjab's tax share from 29 to almost 50 percent. Therefore, by 2006/07, the province's tax share corresponded roughly to its share of the country's population. Simultaneously, there has been a more or less corresponding decline in the tax share of Sindh, from 68 to below 48 percent, although even now the tax share is substantially greater than the population share. In 2006/07 the combined share of the two less populated provinces, NWFP and Balochistan, was very low at less than 2 percent.

This notable shift in tax shares leads us to explore whether or not provincial tax shares change due to changes in the relative size of the tax base or due to relatively higher tax buoyancy coefficients. This decomposition is essential if we are to establish a relationship between the growth of tax revenues and growth of provincial economies.

IV. A Simple Model of Income Tax Revenue

We specify that the level of income tax revenue is given by

$$t = \alpha(y - \bar{y}) \quad \text{where } y > \bar{y} \quad (1)$$

$$t = 0 \quad \text{for } y \leq \bar{y}$$

where t = real per capita tax revenue and y = real per capita income (excluding agricultural income which is exempt from income tax). We take $(y - \bar{y})$ as a measure of taxable capacity. \bar{y} not only has the connotation of an exemption limit but also indicates the income generated by the informal segment of the economy, which is hard to tax and where the level of tax

evasion is high. Equation (1) holds over time if α , the marginal rate of taxation of taxable income, remains constant. It may rise if the income tax structure is highly progressive. This is not the case in Pakistan as the major portion of revenue is generated from deductions at source in the form of withholding/presumptive taxes, which are generally proportional in nature. Also, the tax rate for levels of corporate income is the same.

The tax on nonagricultural GRP may rise as the share of taxable income rises in the regional economy. This implies that

$$\frac{t}{y} = \alpha \left(1 - \frac{\bar{y}}{y} \right) \tag{2}$$

Therefore as y rises, t/y can be expected to increase. It is also evident from (2) that the tax-to-GRP ratio is lower in provinces where the per capita income is lower.

There also exists the possibility that effective tax rates change over time when statutory rates are changed or the income tax net widened by imposing a new form of withholding or presumptive taxes. During the early to mid-1990s, the withholding tax regime was greatly expanded in Pakistan. Equation (1) is modified to capture this effect as follows.

$$t = \alpha (y - \bar{y}) + \beta T \tag{3}$$

where T takes the value of 1, 2, and so on in successive years during which the tax reform was ongoing. During the current decade, income tax rates have generally been revised downward. This can be estimated empirically by the following regression equation over time.

$$t = -\beta_0 + \beta_1 y + \beta_2 T \tag{4}$$

with $\bar{y} = \beta_0 / \beta_1$

Based on this, a pooled regression can be performed across the provinces in the following manner for the period in which information is available on both t and y .

$$t = -\beta_0 + \sum_{i=1}^n \beta_{0i} D_i + \beta_1 y + \sum_{i=1}^n \beta_{1i} D_i y + \beta_{2i} \cdot D_i T \tag{5}$$

where $D_i = 1$ for the i th province and 0 otherwise.

It may also be observed from (1) that

$$\frac{y}{t} \frac{dt}{dy} = \frac{1}{1 - \frac{y}{y}}$$

Therefore, the tax buoyancy coefficient falls as y rises. At the lower limit of y of \bar{y} , it approaches infinity. This is, of course, on the assumption that \bar{y} remains unchanged. However, if \bar{y} rises or falls, the buoyancy coefficient also rises or falls correspondingly.

There are strong indications that the income tax buoyancy coefficient is higher in provinces with a lower per capita nonagricultural GRP. Table-3 provides observed buoyancy coefficients for the period 1992/93 to 1999-2000, for which estimates of each province's GRP are available from Bengali and Sadqat (2006).

The table shows that the tax buoyancy coefficient is highest in NWFP, with the lowest per capita GRP among the three provinces for which data is available. Beyond 1999-2000, while data is available on income tax collections by province, no estimates have been made of the GRPs of individual provinces.

Table-3: Income Tax Buoyancy Coefficient by Province, 1992-93 to 1999-2000

Province	Level of Real Per Capita GRP	Annual Growth Rate (%)		Tax Buoyancy Coefficient ³
		Real Per Capita Tax Revenue ⁴	Real Per Capita GRP ⁵	
Sindh	4,851	0.1	-0.1	n
Punjab	3,002	11.0	1.9	5.8
NWFP	2,309	12.9	1.8	7.2
Balochistan ⁶	-	-	-	-
Pakistan	3,194	4.7	1.4	3.4

Source: FBR/CBR Year Books (various issues), Bengali and Sadqat (2006).

The next section discusses the use of income tax revenue as an indicator of growth in regional economies.

V. Income Tax Revenue as an Indicator of Provincial Growth

The previous section has presented a simple model for explaining the evolution of income tax revenue at the provincial level in Pakistan. This has led to the revenue equation specified in equation (5). If this equation is reversed, then given t for a particular year, y can be determined from the equation. However, prior to doing this, we discuss the merits of using income tax revenue as a proxy for regional income or GRP.

A proxy indicator must have a number of properties. Most importantly, it should be broadly representative in character. Income tax is a broad-based tax and is collected from all sectors of the economy except agriculture. Developments in the withholding tax regime during the 1990s have significantly widened the tax net and cut into evasion through deductions at source. Therefore, trends in income tax collection are likely to capture fairly well the growth in underlying incomes in provincial economies, especially in nonagricultural GRP.

³ Estimated.

⁴ At 1980/81 prices.

⁵ In 1992/93, excluding agriculture.

⁶ Information on income tax revenue in Balochistan is not available.

One problem, however, needs to be resolved. The presumptive income tax on imports, a significant source of revenue, is collected mostly at the stage of clearing import consignments at the port of Karachi. Therefore, most of the revenue from this source is declared as collected in Sindh, although this has little bearing on the level of economic activity in the province. For the purpose of using income tax revenue as an indicator of provincial growth, the former can only be used after having excluded the presumptive tax on imports.

Data on other taxes is also available at the provincial level, but their degree of representativeness is hindered by the problem either of a limited tax base or lumpiness. An obvious alternative proxy is the general sales tax levied on domestic transactions. Here, constitutional provisions restrict this tax to goods, which means that the services sector, which accounts for over half the value-added in the economy, falls outside the ambit of this tax. A number of industries that are export-oriented are also zero-rated from this tax. Therefore, GST coverage is limited to a relatively small part of the economy.

Other taxes, such as import duties and excise duties, have even more serious limitations in being used as indicators of regional development. Collections of the former are lumpy in nature and accrue mostly at Karachi even though import consignments may be destined for other parts of the country. Excise duties are very selective in nature and are only levied on a few industries or services. Various provincial taxes are also specific in terms of sectors such as property and motor vehicles, and cannot be used as broad-based indicators of regional growth. Overall, income tax is the most representative tax of the nonagricultural economy.

Beyond taxes, there are other, perhaps better, proxies of regional development. These could include information from censuses and surveys of population, housing, labor force and employment, living standards and household income and expenditure, although with surveys and censuses of value added in different sectors like manufacturing, agriculture, etc. These are valuable sources of information but may be too infrequently compiled or not disaggregated at the provincial level. Therefore, it is not possible to use these indicators to assess trends in provincial growth on an annual basis. As opposed to this, given that the FBR is compelled to generate information regularly for management purposes, tax collection at the level of the commission rate circle is available more or less up to date.

The recommended approach is one which relies on income tax revenue as the first, albeit approximate, indicator of provincial growth,

supplemented whenever possible with information obtained from periodic censuses and surveys.

We now turn to the relationship between tax revenue and income:

Given that $t = -\beta_0 + \beta_1 y$ and $\hat{t}_0 = -\beta_0 + \beta_1 \hat{y}_0$

Therefore $\hat{y}_0 = \frac{t_0 + \beta_0}{\beta_1}$, $\hat{y}_1 = \frac{t_1 + \beta_0}{\beta_1}$

$$\hat{y}_1 - \hat{y}_0 = \frac{t_1 - t_0}{\beta_1}$$

$$\frac{t_1 - t_0}{\beta_1} \cdot \frac{\beta_1}{t_0 + \beta_0} = \frac{t_1 - t_0}{t_0 + \beta_0}$$

$$g_y = \frac{\frac{t_1 - t_0}{t_0}}{1 + \frac{\beta_0}{t_0}}$$

$$g_y = \left[\frac{1}{1 + \frac{\beta_0}{t_0}} \right] g_t \tag{6}$$

where g_t = growth rate of real per capita income tax revenue and g_y = growth rate of provincial real per capita nonagricultural GRP.

We observe from (6) that if $\beta_0 = 0$ then $g_y = g_t$ otherwise $g_y > g_t$. Interestingly β_0 is the crucial coefficient, not β_1 . We also find that the same growth rate of revenue implies faster growth of income where t_0 is higher (i.e., Sindh).

VI. Results

The coefficients, β_0 and β_1 , can be estimated for each province from equation (5). The regression results of estimating equation (5) are presented in Table-4.

Table-4: Regression Results⁷ (Dependent Variable is Real Per Capita Income Tax Revenue) 1992/93 to 1999/2000

	Coefficients	t-ratio
Constant	-221.092	-3.926
D ₁ ⁸		
D ₂ ⁹		
D ₃ ¹⁰	-47.151	-4.503
D ₄ ¹¹	-50.079	-3.414
y, real per capita income ¹²	0.115	7.117
D ₁ y		
D ₂ y	-0.016	-2.491
D ₃ y		
D ₁ T ¹³	35.988	5.199
D ₂ T		
D ₃ T		
<hr/>		
R ²	0.988	
Degrees of Freedom	26	
F-statistics	446.459	
D-W Statistics	1.380	

These results yield the following values of β_0 and β_1 for each province:

⁷ Only results for significant variables.

⁸ D₁ = 1 for Sindh; 0 elsewhere.

⁹ D₂ = 1 for NWFP; 0 elsewhere.

¹⁰ D₃ = 1 for Punjab; 0 elsewhere.

¹¹ D₄ = 1 for Sindh and Pakistan in 1999/2000, otherwise 0.

¹² Excluding agriculture.

¹³ T=2 for 1992/93, 1993/94, 3 for 1994/95, and 4 for all other regions.

Table-5: Coefficients by Province

	β_0	β_1
Sindh	162.93	0.115
Punjab	256.72	0.115
NWFP	208.27	0.099

Based on these coefficients and equation (8), we finally obtain in Table-6 below the estimated growth rate of nonagricultural GRP in three provinces, Sindh, Punjab, and NWFP, respectively, for the current decade 1999/2000 to 2006/07.

Table-6: Annual Growth Rates (%) (1999-2000 to 2006-07)

	Real Per Capita Income Tax Revenue	Real Per capita Nonagricultural GDP
Sindh	7.1	5.3
Punjab	10.2	4.3
NWFP ¹⁴	13.8	0.6
Pakistan	8.4	4.2

Source: FBR/CBR Year Books (various issues), Bengali and Sadqat (2006).

The conclusions we reach with regard to the growth rates of nonagricultural GRP for the three provinces are striking. Although Punjab has shown the highest growth rate of revenue, the growth rate of the underlying tax base (the nonagricultural economy) has been faster in Sindh. In fact, Sindh appears to have been the fastest growing province in Pakistan from 1999/2000 to 2006/07. It has a growth rate about 1 percentage point above the national growth rate. Punjab ranks next in terms of growth, with a growth rate very close to the national average. There is evidence that the economy of NWFP has stagnated, with very little growth during the last 7 years.

We attempt to test the validity of the above results by identifying which sectors of the economy have been relatively buoyant in Pakistan during the period 1999/2000 to 2006/07, and determining where these fast-

¹⁴ Growth rates calculated from 1999-00 to 2004-05 due to unusual trend in tax revenues.

growing sectors are located. According to the *Pakistan Economic Survey* for 2006/07, the fastest growing sectors have been large-scale manufacturing and banking and insurance with an average annual growth rate of over 11 percent each, as compared to the overall growth rate of the nonagricultural economy of Pakistan of 6.7 percent. These two sectors have a relatively larger share in the economy of Sindh as compared to other provinces (Bengali and Sadaqat 2006). For example, in 1999/2000, the share of value-added in large-scale manufacturing in the nonagricultural economy was almost 21 percent in Sindh, 11 percent in Punjab, and 9 percent in NWFP. Therefore, unless there has been a major relocation of economic activity from Sindh during the last 7 years, it is likely that this province has shown the greatest dynamism because of buoyancy in sectors like large-scale manufacturing, and banking and insurance. Therefore, our results for the variation in provincial growth rates derived from tax data are consistent with the national sector's growth trends.

We also use post-partition data for the Pakistan economy for the period 1971/72 to 2007/08 to further validate our results for the long run. We introduce two dummy variables:

DD=1 for 1985-86 to 1992-93 otherwise 0

DD2= 1 for 2005-96 to 2007-08 otherwise 0

The regression results are as follows:

Table-7: Regression Results (Dependent Variable is Real Per Capita Income Tax Revenue)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-316.4613	43.27957	-7.312026	0.0000
Per capita income	0.058320	0.002775	21.01922	0.0000
DD	-207.5783	27.65288	-7.506569	
DD2	127.8589	51.09504	2.502373	0.0175
R-squared	0.962760	Mean dependent var.	571.1892	
Adjusted R-squared	0.959374	S.D. dependent var.	338.8576	
SE of regression	68.29973	Akaike info criterion	11.38749	
Sum squared resid.	153940.2	Schwarz criterion	11.56165	
Log likelihood	-206.6687	Hannan-Quinn criter.	11.44889	
F-statistic	284.3778	Durbin-Watson stat	1.386145	
Prob(F-statistic)	0.000000	Observations	37	

Based on the regression results, we develop a forecasting equation and estimate the level and growth of nonagricultural GDP as follows:

Table-8: Level and Growth of Nonagricultural GDP (Base Year 2000/01)

Years	Actual Nonagricultural GDP	Estimated Nonagricultural GDP
1971-2002	8058	8058
2007/08	26282	25602
Growth (%) (1971-2002 to 2007/08)	3.33%	3.26%

VII. Conclusion and Policy Recommendations

Estimates of the size, composition, and growth of the provincial economies of Pakistan are not generated by official statistics agencies. This has made subnational planning difficult. These estimates need to be generated on a regular basis.

Meanwhile, proxies or indicators have to be used to track regional development. The paper has proposed the use of real income tax revenue as one indicator of growth in the real nonagricultural economy of a province. The FBR generates information on the former on a regular basis.

Based on the estimated relationship between growth in revenue and economic growth, it appears that, while Punjab was the fastest growing province during the 1990s, Sindh has shown the greatest dynamism during the current decade. This is attributed to high growth rates, especially in large-scale manufacturing during the period, which has a larger sectoral share in the economy of Sindh.

References

- Bauls, A. Jankevics, J. and Krijāne, Z. (2000). Determination of Latvian Settlement Structure of Lager Urban Areas. In Latvian Universities 58th Scientific Conference on *Earth and Environmental Science*. Papers Abstracts, Latvian University, 18-20.
- Bengali, K. and Sadqat, M. (2006). *Regional Accounts of Pakistan: Methodology and Estimates-1973-2000*. Social Policy and Development Center, Karachi.
- Government of Pakistan (Various Issues), *FBR/CBR Year Books Revenue Division*. Directorate of Research and Statistics, Federal Board of Revenue, Federal Board of Revenue, Islamabad.
- Government of Pakistan (Various Issues), *Economic Survey*. Economic Advisory Wing, Ministry of Finance, Planning and Economic Affairs, Economic Advisory Wing, Islamabad.
- Government of Pakistan (Various Issues), *Pakistan Demographic Survey*. Statistics Division, Ministry of Economic Affairs and Statistics, Federal Bureau of Statistics, Karachi.
- Krūzmētra (2006). Population Stratification of Pierīgā. In Latvian University 58th Scientific Conference on Geography, Geology and Environmental Science. Papers Abstracts, Latvian University, 64-66.
- Paiders, J. (2006). How Nature Protection Restrictions Affect Economic Development? An Example of Municipalities from the North Vidzeme Biosphere Reserve, Latvia. In ZBR and VIA 1, Scientific Conference on Nature Protection Economic, Social and Cultural Aspects. Vidzeme University College: Latvia.
- Svarinska (2004). Latvian Association of Local Dressing Mechanisms. In 5th International Conference on Enterprise Problems and Solutions of Globalization. Collection of Articles, Turība School of Business Administration, 396 - 405.

- Varts, Z. (2006). Rīgas and Surrounding of Pagastu Novadu Saikne, In Latvian University 64th Scientific Conference on Geography, Geology and Environmental Science. Abstracts of Papers, Latvian University : 137-139.
- World Bank (2005). *Punjab Economic Report: Towards a Medium Term Development Strategy Economic Policy & Poverty Sector (SASEP)*, World Bank, Pakistan.

Appendix

Estimation of Income Tax Revenue by Province

The FBR has divided the Pakistan economy into the following five regions since 1992/93 for income tax collection: Southern Region, Northern Region, Eastern Region, Central Region and Corporate Region. In 2006/07, FBR divided Pakistan economy into Regional Tax Offices or Units. We identify these Commission rates, Regional Tax Offices or Units in each province as given below:

Regional Income Tax Offices, Commission Rates and Tax Payer Units by Province

Sindh	Punjab	NWFP	Balochistan
CIT, Companies-I, Karachi	CIT, `A' Zone, Lahore	CIT, Peshawar Zone	MTU, Quetta
CIT, Companies-II, Karachi	CIT, `B' Zone, Lahore	CIT, A Zone, Peshawar	RTO, Quetta
CIT, Companies-III, Karachi	CIT, `C' Zone, Lahore	CIT, B Zone, Peshawar	
CIT, Companies-IV, Karachi	CIT, Companies, Lahore	CIT, Companies Zone, Peshawar	
CIT, Companies-V, Karachi	CIT, Companies-I, Lahore	RTO, Abbottabad	
CIT, Survey & Reg., Karachi	CIT, Companies-II, Lahore	RTO, Peshawar	
Special Zone, Karachi	Special Zone, Lahore		
CIT, `A' Zone, Karachi	CIT, Companies-III, Lahore		
CIT, `B' Zone, Karachi	CIT, Survey & Reg., Lahore.		
CIT, `C' Zone, Karachi	MTU, Lahore		
CIT, `D' Zone, Karachi	CIT, Sahiwal Zone, Sahiwal		
CIT, `E' Zone, Karachi	CIT, Bahawalpur Zone		

CIT, 'F' Zone, Karachi	CIT, Multan Zone
CIT, Hyderabad Zone	CIT, Faisalabad Zone
CIT, Sukkur , Sukkur	CIT, Faisalabad, Companies
MTU Karachi	CIT, Sargodha Zone
LTU, Krachi	CIT, Gujranwala Zone
RTO, Sukkur	CIT, Sialkot Zone
RTO, Karachi	CIT, Rawalpindi Zone
LTU, Karachi	CIT, Islamabad Zone
	CIT, Islamabad Companies
	CIT, Sur, & Reg, Islamabad
	LTU, Lahore
	LTU, Islamabad
	RTO, Faisalabad
	RTO, Multan
	RTO, Rawalpindi
	RTO, Gujranwala
	RTO, Islamabad
	RTO, Sialkot
	RTO, Lahore
