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The elasticity of taxes to GDP in Bangladesh: Implications for policy

B M Sajjad Hossain[1*], Md. Taufiqul Islam[2], Shibli Ahmed Khan[3]
[1,2]Department of Social Science, American International Unviersity-Bangladesh; bmsajjad@aiub.edu (B.M.S.H.).
[3]Department of Management, American International Unviersity-Bangladesh.

Abstract: This study investigates the relationship between economic growth and the elasticity of taxes in Bangladesh from 2007 to 2018. The study used the exponential smoothing OLS method to estimate the elasticity of the tax system in Bangladesh. The data has been collected from the secondary sources. The paper represented a model to analyze the data and find the expected values of income tax, VAT, import and export duty, and GDP to provide guidelines for policy implication and improvement options. The study found a df increase of 1% in import has a relatively positive impact on the import volume regression model.

Keywords: *Bangladesh economy, Elasticity of taxes, GDP, Income tax, Policy implication, VAT.*

1. Introduction

Tax revenue plays a positive role in the national income and significantly impacts the GDP over time. The overall tax structure is generally inelastic to national income (Chowduri et al. 1998). The National Bureau of Revenue (NBR), the apex body of the government of Bangladesh, is responsible for tax collection and management from several sources. The NBR collects 95 percent of the total tax revenue of Bangladesh. The other non-NBR taxes include narcotics duty, land revenue, non-judicial stamps, registration fees, and vehicle tax (Begum, 2007).

The NBR exceeded the revenue collection target in recent years, but the tax effort still needs to improve compared to other neighborhoods and dependent on foreign assistance. Taxes contributed about eighty percent of the total internal resources of funds in Bangladesh. This collection is the principal source of domestic resources for implementing the national budget. It influences industrialization, trade and commerce, and the country's investment climate.

Over the years, NBR has shown significant progress in revenue collection. The direct tax was the highest among all categories. With a 33.25% growth under the direct tax category which was considered as one of the highest in Asia too (Karim & Alauddin, 2012). However, it is one of the major areas of the revenue source/collection. No doubt, taxation contributed to the development of the socio-economic sectors of a nation. The government aims to get more revenue through better tax systems to serve the citizens and meet development expenditures. The tax-to-GDP ratios have been unchanged since the early 1980s (Oliver, 2013). With a steady growth rate, Bangladesh is trying to increase its self-reliance in the financial sector too.

However, having a narrow tax base, the tax to GDP ratio was 11.17 percent in 2016-17 in Bangladesh which is considered as one of the lowest in the global list. Earlier, it was recorded at only 10 percent, considered the lowest among the SAARC countries (World Bank, 2013). The large informal sector dominates the tax administration here and the rate of the informal economy was about 27.60% (Medina and Schneider, 2018).

There were some improvements in the last two decades, but the performance is still unsatisfactory, including other economic development parameters, compared to neighboring countries. The main

* Correspondence: bmsajjad@aiub.edu

problems behind this scenario are tax avoidance and tax evasion, and most tax revenue depends on indirect tax rather than direct one.

Table 1.
Collection By NBR in Bangladesh.

Sources of Taxes	Average Collection
Income Tax	37%
Value Added Tax (VAT)	36%
Supplementary Duty	15%
Customs Duty	10%
Excise Duty	1%
Others	1%

Source: NBR, 2018

Table 1 shows that 73 percent of total collected taxes by NBR are generated from only two sources. i.e., income tax (highest) and VAT. Others are supplementary duty, custom duty, excise duty, and others contributing 15%, 10%, 1%, and 1%, respectively (see Figure 1).

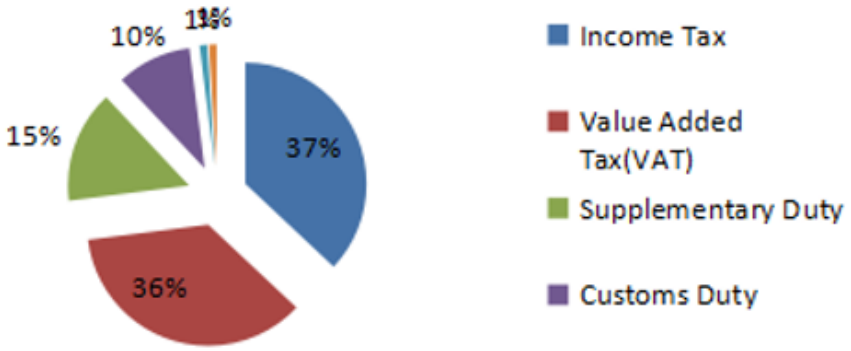

Figure 1.
NBR collection.

The contribution of Tax Revenue to the GDP generation is enormous in Bangladesh. The per capita GDP in Bangladesh for 2021 was $2,458, a 10.06% increase from 2020; per capita GDP growth is expected to be 4.1 percent in 2023 and 5.4 percent in 2024. As expected, Bangladesh's GDP growth will be 5.3 percent in 2023 and 6.5 percent in 2024 (World Bank, 2023). However, Bangladesh's GDP Annual Growth Rate averaged 5.69 percent from 1994 until 2016 and reached its highest record in 2016 at 7.11 percent and a low of 4.08 percent in 1994 (World Bank, 2017). The tax revenue collected by NBR has a tremendous impact on Bangladesh's rise in GDP. The tax revenue to GDP share has increased in Bangladesh over time (see Figure 2).

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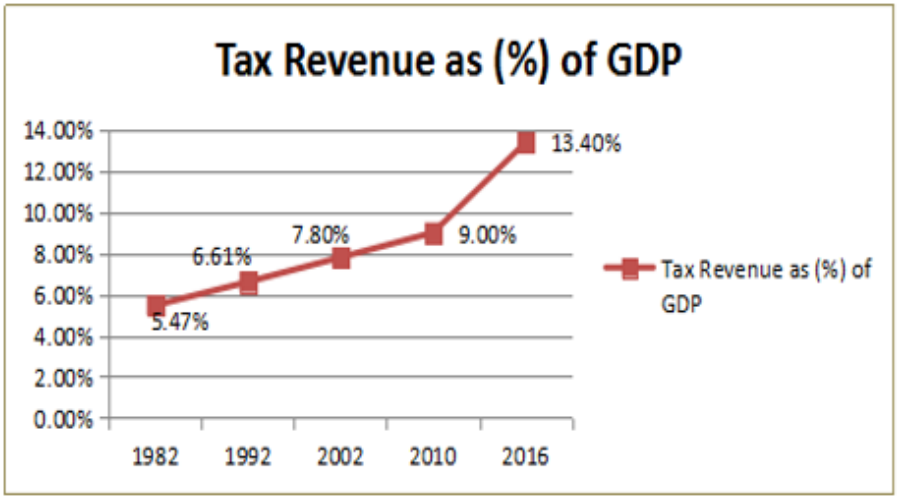

Figure 2.
Tax revenue as (%) of GDP.
Source: BBS, 2018.

The table shows that Tax to GDP contribution was 5.47% in 1982 and later it increased to 6.61% by 1992 over a decade. Moreover, the tax contribution grew from 1992 to 2016, reaching 13.40% in 2016. The result of an increase in the contribution is the rise of collecting tax by NBR year by year. Finally, the contribution of tax to GDP has been increasing over the years. The tax revenue growth rate was 20.94% in 2000, which increased to 11.64% in 2001. The tax revenue growth rates were 10.54% and 13.33%, respectively, in 2016 and 2017 (BBS, 2018).

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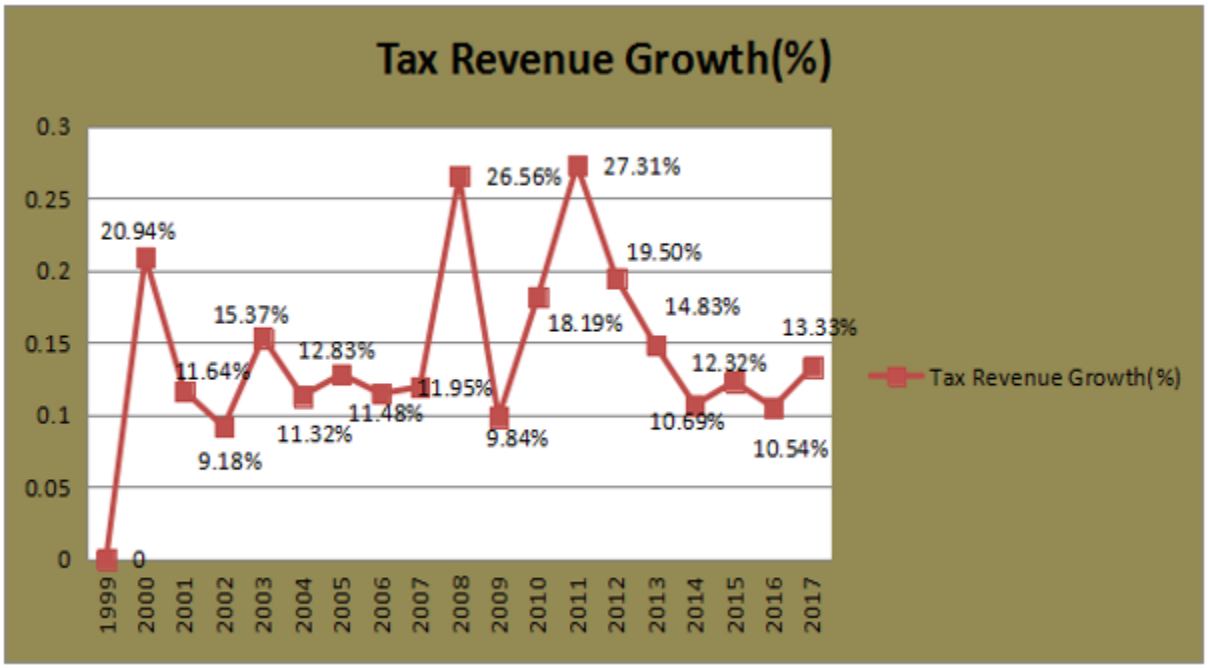

Figure 3.
Tax revenue growth (%).
Source: BBS, 2018.

Bangladesh is behind many neighboring nations in the revenue-GDP ratio (see Figure 4).

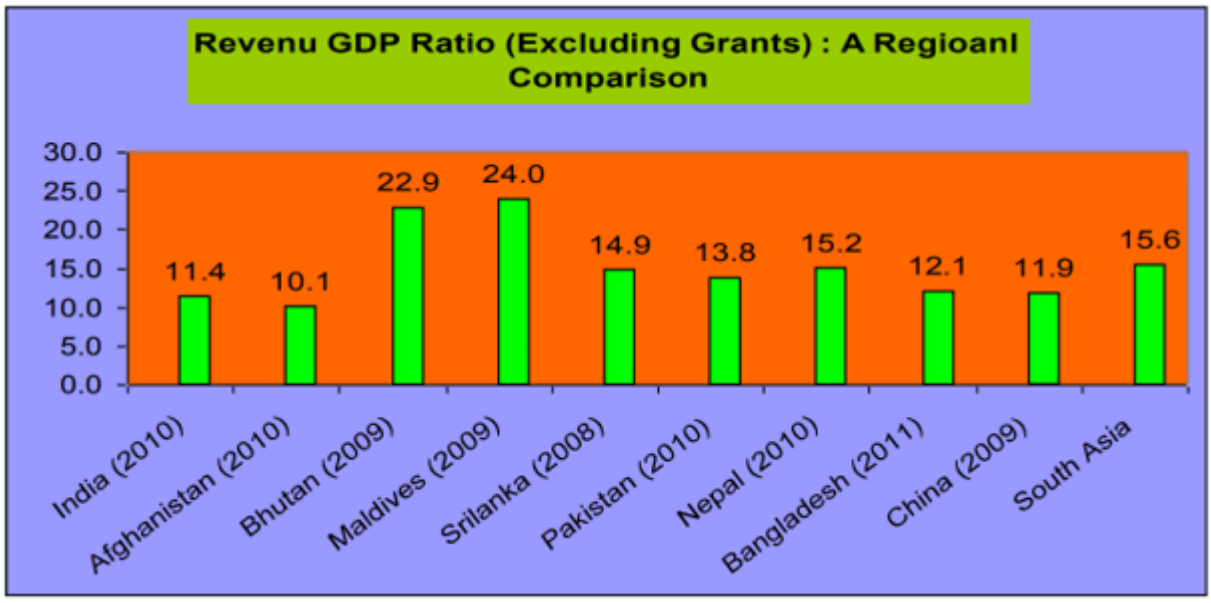

Figure 4.
Revenue GDP ratio (Excl. grant): A regional comparison.
Source: BBS, 2018.

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Considering the present situation in Bangladesh compared to other regional states, the overall stage is better than the average level. However, this paper attempts to estimate the elasticity of taxes and GDP as a primary objective.

2. Literature Review

Chowdhury et al. (1988) examined the elasticity of tax categories using regression analysis in log-linear form in the context of Bangladesh. it used only the proportional adjustment method and resulted in total tax revenue, income tax, sales tax, and VAT being elastic in relation to tax bases.

Zaman and Talukder (1996) focused on constructing an import demand function for Bangladesh. They utilized the two-stage least square method and discovered that import prices, measured by the ratio of import and domestic price indices, were the primary determinant of import demand, rather than GDP. The estimated price was -0.86 and income elasticities were +0.21.

Taxation is a crucial source of government revenue and plays a significant role in the socioeconomic structure by influencing the relationship between GDP growth and indirect taxation. The government's actions to ensure incentives for producers and entitlements for consumers are driven by taxation policies. Nadeem et al. (2015) found a negative relationship between GDP growth and indirect tax in the case of value-added tax in Pakistan. Their study, based on data from 1979 to 2010, revealed that a 1% increase in sales tax and excise duties led to a 3.8% decline in GDP growth.

Plosser (1992) reviewed the impact of tax increases on economic growth across 24 OECD countries from 1960 to 1989. His findings indicated that a 0.05% increase in the average tax rate would result in a 0.4% reduction in the economic growth rate. Besides, James et al. (2006) highlighted the adverse effect of high marginal tax rates, particularly rates exceeding 50%.

In Canada, Ergete and Bev (2012) studied the impact of provincial government tax rates on economic growth using panel data from 1977 to 2006 and indicated that higher provincial statutory corporate income tax rates were associated with lower private investment and slower economic growth.

Engen and Sinner (1996) examined the relationship between tax and economic growth based on accumulated evidence and resulted a high tax/es are detrimental to economic growth, lower taxes tend to have modest positive effects. Taxation impacts different income groups differently, with lower-income groups experiencing reduced savings and investment due to taxes and higher-income groups facing decreased consumption, both affecting economic growth.

Tax reforms should aim to achieve target economic growth without excessively burdening citizens. Blanchard and Perotti (2002) argued that both tax increases and increases in government expenditures have a negative impact on investment spending and the efficient use of tax revenue required to stimulate economic growth.

In the Chinese economy, Yi and Suyono (2014) discovered a negative relationship between tax revenue and economic growth. Besides the research suggested that tax cuts with positive effects.

In Nigeria, John et al. (2014) identified a significant effect of total tax revenue on economic growth in the long run. Lutfunnahar (2007) analyzed and found a low tax-to-GDP ratio due to the underutilization of tax revenue.

Roshaiza et al. (2011) analyzed the economic growth and tax revenue relationship in Malaysia from 1970 to 2009 and found no significant impact of tax changes on economic growth. Solow's (1956) neo-classical growth model suggested that taxes do not affect growth rates as well as total factor productivity in the long run.

While previous research has extensively examined determinants and implications related to import and export demand functions, tax reform, tax performance, and sales tax, limited studies have investigated the relationship between tax and GDP in Bangladesh. Therefore, this study aims to analyze this relationship and explore the tax contribution to the country's economic growth based on data from 2007 to 2018. The study utilized the OLS regression method to examine the relationship and revealed that taxes have a positive impact on the gross domestic product, thereby contributing to the overall economic growth of Bangladesh.

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From the analysis of authoritative literature, taxation is a vital government revenue source, and its relationship with GDP growth and economic development varies based on specific factors. While some studies suggest a negative impact of taxes on economic growth, others emphasize the modest positive effects of lower taxes. Tax reforms should prioritize the efficient use of tax revenue to achieve economic growth without overburdening citizens.

3. Methodology

This paper used secondary data from the NBR records, the BBS Yearbook, and the Bangladesh Bank's annual reports. The study used the OLS Method and multi-regression methods to analyze the data. Bar diagrams and such graphical representations have been prepared for easy understanding of the content. It has recommended a few issues under concluding remarks.

3.1. Research Question

Does the elasticity of taxes related to GDP in Bangladesh support policy implications? The study focuses on collecting domestic resources to implement the national budget. It influences industrialization, trade and commerce, and the country's investment climate.

The paper tried to answer the following research question: Is there a direct relationship between taxes and GDP in Bangladesh for economic growth?

NBR undertook to gear up revenue mobilization to support GDP. However, this research attempts to have a closer look at the elasticity of tax with respect to GDP generation and contribution to the country's overall development.

Table 4.
Estimation results.

Variable	Model 1 income tax	Model 2 import volume	Model 3 export volume	Model 4 vat
GDP	1.312716*** (0.0751214)			
Import		(7698.842) 144795.4***		
Export			341.3442*** (7.981449)	
Cons	-8.790612	-1567052	-1646.142	-5.59387
No. of observation	11	11	11	11
R- squared	0.9714	0.9752	0.9967	0.9881

Note: *** denote 1% levels of significance. Models are estimated using the OLS method SS, DF, and MS.
Source: Authors calculation using STATA, 2023.

4. Result and Analysis

R-squared is a statistical measure of how close the data are to the fitted regression line (Frost, 2017). It is also known as the OLS regression and multiple regression. The value of R- square is high, which indicates that the model can explain all the variables in the mean.

The first equation (eq-1) is our overall income tax (the dependent variable) which is the elasticity of taxes with respect to GDP in Bangladesh's implication for policy. This data was sourced from the Finance Division, Ministry of Finance (year-end report) Bangladesh Economic Review, and Bangladesh Bureau of Statistics. We use the time series data from 2007 to 2018 as our linear model.

This regression was run in the OLS method using STATA. df (degrees of freedom) is estimated from the result. This shows that there is a significant relationship between the GDP and income tax of Bangladesh. If the GDP increases by 1% then the income tax is a positive relationship with the GDP.

In the 2nd equation OLS method, the result is shown as df increase in 1% import is a relatively positive impact on import volume regression model.

In the 3rd equation OLS method, as shown in the results, the df increase in 1% export has a

relatively positive impact on the export volume regression model.

The last equation OLS method, the VAT and GDP variables as the equation, and the elasticity of taxes in GDP in Bangladesh increased by 1%. The result shows that VAT has had a positive impact on Bangladesh. Since the relationship is positive, the influence of the elasticity of taxes with respect to GDP in Bangladesh has policy implications. The rest of the test results are found similar to other regressions.

4.1. Model Analysis

Gross domestic product = GDP
National board revenue = NBR
Value-added tax = VAT
Revenue tax = REV
Income tax = INC
Import duty = IMP
Export duty = EXP
Supplementary duty = SUP
Excise duty = EXC
Other duty = OTH
Time = Tim
Year = YER

$$\text{Income tax} = a + b\,\text{GDP} + c\,T \quad (1)$$
$$\text{Import duty} = d + \text{import volume} + g\,T \quad (2)$$
$$\text{Export duty} = e + \text{export} + h\,T \quad (3)$$
$$\text{VAT} = k + \text{GDP} + T \quad (4)$$

4.2. Discussion of Results

In this research, the analysis of data is made to measure the elasticity of taxes with respect to GDP in Bangladesh. About 2 percent growth of tax to GDP ratio is found from 2006 to 2014, but it was expected at 12.4 percent by 2015 and the tax collection was -8.11 percent of the target in 2017. That means it has fluctuated in two decades. According to the literature, an increase in income tax leads to a lower wealth effect. However, in this study, in contrast, the result shows a positive relationship between GDP and income tax, and also an increase in value-added tax in Bangladesh. This research found a positive relationship between OLS estimators that increased VAT, export, import, and other taxes.

The elasticity of taxes with respect to GDP is an important concept in economics. It measures the responsiveness of tax revenue to changes in GDP. In Bangladesh, the tax revenue as a percentage of GDP has been increasing over the years (Shome, 1988). According to the International Monetary Fund (IMF), tax revenue as a percentage of GDP in Bangladesh was 8.1% in 2020 (IMF, 2021).

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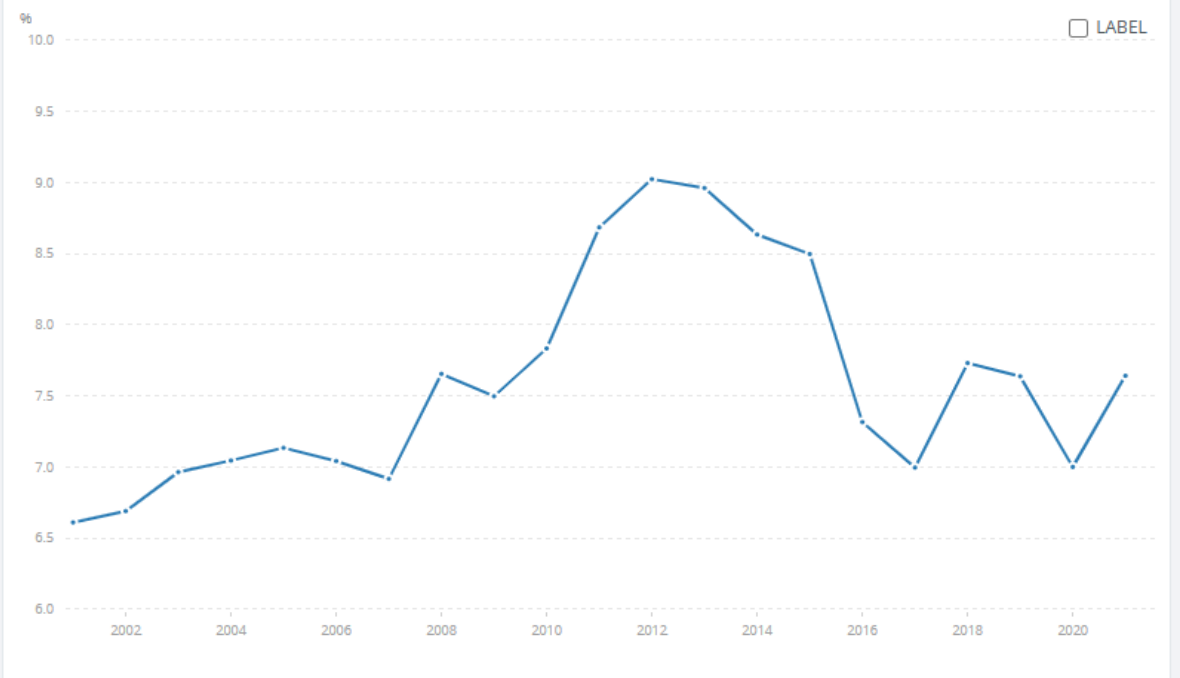

Figure 5.
% of tax to GDP in Bangladesh.
Source: IMF, 2020.

Bangladesh needs to review, reform, and improve its tax policy and tax-to-GDP ratio based on its socio-economic conditions for stable and long-run economic growth. However, more comprehensive data may support increasing the evaluation methodology and provide accurate results (Hosen, 2019).

5. Conclusion and Recommendations

Underdeveloped nations take many large investment projects with the support of the private sector for extensive infrastructure development and bear huge expenditures. Hence, Tax and non-tax revenue are the primary sources of internal resource generation to meet this. Both in terms of income and population, the primary from direct taxes is substantial public expenditure. It was found that Bangladesh's total revenue GDP ratio is low at less than 10 percent. Taxes contribute more than 80 percent towards the overall revenue receipts of the country. Direct taxes account for less than a quarter of the total tax revenue. Agricultural income contributes little even though this sector accounts for around 50 percent of the country's GDP. On the other hand, less than 0.5 percent of the population is liable to pay individual income tax.

For long-run benefits and continuing the development programs, the nation needs to find untapped sources under the tax net to increase tax efforts. This taxation cannot again be a once-for-all measure. As argued earlier, new tax bases will appear, if nothing else, due to the monétisation of the economy as a consequence of economic development. Therefore, a continuous search for new tax items and sources of finance should be carried out to widen the tax base.

The tax structure should be so designed that it is sufficiently elastic to automatically mop up a larger share of incremental income due to economic development to the public exchequer. In other words, once the ad-hoc measures raise the tax effort, an elastic tax structure would help sustain it without requiring further legislation.

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Appendix I

Table 1.
Major tax and non-tax categories as % of GDP.

Fiscal year			As % of GDP		
	Total tax	Income tax	Customs duties	Sales tax & VAT	Non-tax
1979-80	5.20	0.65	2.23	2.03	0.84
1980-81	5.69	0.70	2.32	2.29	1.44
1981-82	5.47	0.78	2.16	2.15	1.01
1982-83	5.23	0.80	2.13	1.95	0.82
1983-84	4.84	0.69	1.91	1.94	0.85
1984-85	5.28	0.69	2.11	2.02	1.08
1985-86	5.22	0.73	2.12	1.95	1.23
1986-87	5.31	0.76	2.12	2.00	1.13
1987-88	5.53	0.83	2.07	2.14	0.97
1988-89	5.44	0.79	2.07	2.12	1.04
1989-90	5.70	0.78	2.13	2.27	0.99
1990-91	5.96	1.02	2.15	2.30	1.27
1991-92	6.61	1.08	2.30	2.63	1.60
1992-93	7.30	1.29	2.29	2.31	1.65
1993-94	7.18	1.26	2.20	2.14	1.97
1994-95	7.42	0.97	2.40	2.38	1.79

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1995-96	7.32	0.92	2.27	2.43	1.94
1996-97	7.44	0.92	2.22	2.51	1.78
1997-98	7.39	0.98	2.27	2.40	1.40
1998-99	7.17	1.07	2.16	2.31	1.39
1999-00	6.78	1.10	1.79	2.29	2.09
2000-01	7.80	1.38	2.01	2.62	1.34
2001-02	7.80	1.39	1.97	2.66	1.68
2002-03	8.22	1.41	2.22	2.69	2.05
2003-04	8.24	1.41	2.13	2.66	1.96
2004-05	8.45	1.50	2.13	2.86	2.03
2005-06	8.55	1.72	1.88	3.01	2.07
2006-07	8.27	1.85	1.73	2.96	1.87
2007-08	9.06	2.15	1.76	3.28	2.30
2008-09	8.98	2.25	1.52	3.32	1.81
2009-10	9.33	2.45	1.30	3.57	1.90
2010-11	10.49	2.79	1.37	3.90	1.68

Appendix II

Table 2.
Major categories of taxes as % of total tax revenue.

Fiscal year		% of total tax revenue	
	Income tax	Customs duties	Sales tax & VAT
1979-80	12.46	42.87	38.98
1980-81	12.38	40.81	40.28
1981-82	14.17	39.56	39.32
1982-83	15.26	40.76	37.26
1983-84	14.28	39.36	39.96
1984-85	13.00	39.87	38.34
1985-86	13.99	40.54	37.33
1986-87	14.31	39.88	37.58
1987-88	15.02	37.40	38.76
1988-89	14.57	38.08	39.04
1989-90	13.69	37.40	39.92
1990-91	17.10	36.04	38.65
1991-92	16.38	34.76	39.73
1992-93	17.62	31.41	31.62
1993-94	17.53	30.68	29.86
1994-95	13.13	32.38	32.07
1995-96	12.59	30.99	33.22
1996-97	12.38	29.83	33.76
1997-98	13.32	30.69	32.47
1998-99	14.99	30.09	32.27
1999-00	16.20	26.45	33.80
2000-01	17.70	25.79	33.65
2001-02	17.78	25.31	34.14
2002-03	17.14	27.01	32.77

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2003-04	17.16	25.84	32.35
2004-05	17.80	25.26	33.85
2005-06	20.16	22.03	35.24
2006-07	22.32	20.87	35.74
2007-08	23.74	19.41	36.15
2008-09	25.11	16.98	36.94
2009-10	26.31	13.89	38.30
2010-11	26.59	13.02	37.13

Source: Indirect taxes contribute more than 75 percent towards total tax yield and taxes on imports more than 50 percent.

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