IMPACT OF RAISING TAX RATES ON GDP GROWTH: THE CASE OF NEPAL

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Abstract: This study is an effort to examine whether there exists a potential of the variations in tax efforts of different types in making positive impact on economic growth in a typical developing economy. We take the case of Nepal and analyze 44 years (1975-2018) of time series data of growth and fiscal variables. Our conclusion is that Nepal has already reached its optimal tax GDP ratio and additional efforts to collect more tax revenue are counter-productive; rather it should take some other structural measures for higher GDP growth. Implementation of several scenarios of revenue replacement does not have significant positive impact on GDP; however, minimizing the contribution by excise duties but replacing its contribution by income tax has minimal positive impact on GDP. This refers the need of protection of Nepalese infant industries at this juncture of fiscal-growth discourse of this small developing economy.

Key Words: tax rates; public sector revenue; GDP growth

JEL Classifications: H 21, O 40; H 24

1. General Background

The impact of restructuring tax rates on GDP growth is crucial in the wake of economic reforms in different economies, more specifically after mid 1980s that witnessed liberalizations in both factor and product markets. Three major strands of analysis are existent in this regard so far. Many researchers analyzed the impact using partial analysis with select macro variables; however, some followed general equilibrium analysis. A third group of analysis is exploratory in nature, before after analysis and the cross country comparison. The conclusions of these studies are hardly consistent to each other. In the vast array of literature, evidences are apparent showing the growth enhancing and retarding effects of different tax systems as well as short-term and long-term effects on growth and other macroeconomic performance of the economy. However, as Rimmler *et al.* (2017) remarks tax revenue in variety of forms still dominates the public sector revenue in developed, developing, as well as under-developed economies.

Impact of tax structure on economic growth occurs through its effect on both labor and capital markets. More specifically, the level of capital and intermediate goods tax has a significant effect on economic growth; countries with lower tax rates grow faster than those applying high tax rates (Gerson, 1998). With reference to the tax types, high direct taxes reduce consumer spending in the short-term and reduce economic efficiency and welfare in the long run, Gale and Samwick (2014). Analyzing the relationship between taxes and the rate of economic growth among 23 OECD countries for the period 1965-1990, Widmalm (1999) demonstrated that taxes have a negative effect on economic growth. The econometric analysis also revealed that progressive taxation results with more adverse effect on real GDP.

Romero-Avila and Strauch (2008) reached the conclusion with the negative impact of direct taxes on GDP growth rate per capita through the strong negative impact on accumulation of physical capital. Ferede and Dahlby (2012) and Nechaev and Antipina (2016) also concluded with overall negative impact of tax effort ratio to the GDP growth rate. However, Asllani and Statovci (2018) and Gasteratos *et al.* (2016) treated the impact differently to basic consumption products and luxury products with the conclusion that the reduction of tax rate on the consumption of basic products and an increase in tax rate on luxury products has a positive effect on the growth of GDP.

Contrary to the conclusions of the studies mentioned above, Arnold (2008) concluded with the positive impact of taxes on consumption and taxes on personal income. Furthermore, the corporate income taxes have the most negative impact on GDP per capita, while real estate taxes and especially reuse tax on real estate has a more positive effect on growth. High corporate taxes discourage potential investors from realizing investments in the given country because they reduce the return on invested capital and and eventually the age of a company (Daniel and Jefferey 2013). Schraztenstaller and Kohler (2015), however, demonstrated negative link between corporate tax and foreign direct investment (FDI).

Various studies conclude that given the macroeconomic parameters, public revenues affect economic growth more than public expenditures.

Public financial system in Nepal has undergone significant changes for the last three and half decades. Several initiatives do have significant impact on Nepalese public sector revenue and consequent expenditure system. Liberalization of health and education services began in mid-eighties as a component of structural adjustment program of the World Bank. Likewise, full convertibility of the current account and partial convertibility of the capital account as well as relaxation of the price control in both factor and product markets appeared as a policy prescriptions of the Stabilization Program of the International Monetary Fund (IMF). Privatization of state-owned enterprises initiated in the beginning of 1990s. Furthermore, Nepal received the membership of the World Trade Organization, South Asian Free Trade Agreement (SAFTA) and the Bay of Bengal Initiative for Multi-Sectoral and Technical Co-operation (BIMSTEC) in mid-2000s. Moreover, along with the

adoption of federal system of governance revenue and expenditure flows have spread to three tiers of the government.

Several studies exist in measuring tax productivity in Nepal, VAT and other tax potentials. Examples include Acharya (2016a, 2016b, 2010). However, studies assessing the growth impact of these reform measures are absent, more specifically the impact of tax rate changes on production and work incentives that eventually translate into growth performance of the economy. This study intends to fulfill this gap. The reminder of this paper runs as follows. Section 2 mentions about the objectives and methods of the paper followed by data and observations in section 3. Section 4 presents the analysis and discusses the results. Section 5 concludes.

2. Objectives and Methods

This study makes a review of the budgetary reforms for the last three decades in light of high growth potential of the country. In this regard, it makes assessment of the elasticity of various taxes in Nepal and explores the tax potentials of them. Furthermore, it explores the avenues that circumvent the combinations of tax and other variables that affect the growth performance of the economy.

The major data used in this study are as follows:
(a) Total revenue series by various tax categories from 1970s to the latest available
(b) Time series data bases of various tax types
(c) Reports of the public expenditure reviews of the government conducted in various time periods
(d) Consistent time series data of the major macroeconomic variables, i.e. GDP by sectors, growth rates, employment, domestic investment, capital formation, foreign direct investment, etc.

Broader methodological approach to this study has comprised:
A. Review of the available methods in measuring the impact of the tax rate changes on economic growth,
B. Include both short term dynamic relationship between revenue variables and GDP growth,
C. Include other variables that impact GDP along with the revenue variables, and
D. Keep revenue GDP ratio as controlled variable while assessing the impact of the variations of different tax type on growth performance of the economy.

The study has conducted some econometric analysis that stemmed from the previous works by various researchers. Based on the best fit models on revenue vs. growth diagnostics, the study has conducted some simulation analyses with the impact of increase in public sector revenue on the overall growth performance of the economy. The improvement in the revenue generation capacity of the government is instrumental in

funding priority investments and programs, and to institute a simpler, fairer and more efficient tax system in the developing economy.

Three methodological approaches exist in analyzing the impact of tax rate changes on Gross Domestic Product (GDP): tax multiplier approach, general equilibrium approach, and partial equilibrium approach. The tax multiplier approach uses the following model in assessing the impact of tax rate change on GDP:

$$Y = a + b(1-t)Y - b(1-t)T_0 + b(1-t)tr + I + G \tag{1}$$

where Y, G, and I refer GDP, government expenditure, and total investment, respectively. a, b, t, and tr are the autonomous consumption, marginal propensity to consume (MPC), tax rate, and transfer payment, respectively. T_0 is the fixed revenue.

Equation (1) can be solved as

$$Y = \frac{a - b(1-t)T_0 + b(1-t)tr + G}{1 - b(1-t)} \tag{2}$$

Based on this three-sector model, the tax impact on GDP is measured using the tax multiplier and this can be expressed as follows:

$$K_t = \frac{-b(1-t)}{1 - b(1-t)} \tag{3}$$

This multiplier approach in assessing the taxation impact on GDP end up with the conclusion that taxation has contractionary impact on output. The economic growth and revenue dynamics was initially modeled by Arnold *et al.* (2011).

$$\Delta Iny_{it} = -\phi_i(INy_{it-1} - \beta_1 Ins_{it}^k - \beta_2 In\,h_{it} + \beta_3 n_{it} + \Sigma\beta_j\,V_{it}^j - a_{it}) + b_{1i}\Delta Ins_{it}^k + b_{2i}\Delta In\,h_{it} +$$
$$b_{3i}\Delta n_{it} + \Sigma b_{ji}\Delta V_{it}^j + \varepsilon_{it} \tag{4}$$

In equation 4, y refers GDP, s the ratio of investment to accumulated capital, h the average number of schooling of the working age population, n the population growth rate, and V the tax policy variables.

The present study follows this modular framework with slight modification in line with that of Acosta-Ormaechea and Yoo (2012) that essentially follows Arnold *et al.* (2011). More specifically, we study the relationship as follows:

$$g_t = -\phi(g_{t-1} - \alpha_1 I_{t-1} - \alpha_2 In\,h_{t-1} - \alpha_3 n_{t-1} - \alpha_4 T_{t-1} - \Sigma_{j=5}^m \alpha_j\,.\,TC_{t-1}^j) + \beta_1\Delta I_t +$$
$$\beta_2\Delta\ln h_t + \beta_3\Delta n_t + \beta_4\Delta T_t - \Sigma_{j=5}^m \beta_j\,\cdot\,\Delta TC_t^j + \gamma.t + \varepsilon_t \tag{5}$$

In the given equation g is the GDP per capita growth, I is the investment ratio, and h is the number of years of schooling, n is the population growth, T is the tax revenue as a share of GDP. TC is the vector of tax-composition variables expressed as a share of total tax revenue. The subscript t refers the time in years and ε the error term.

The equation 5 has two broader components. The first, kept in the parenthesis that is also known as error correction term, captures the long-term relationship between growth and the explanatory variables. The variable T has been regarded as a control variable that is kept intact along with the variations of shares of different taxes in overall tax revenue. The second part, terms outside the parenthesis, measures short term dynamic effect of all the explanatory variables used in the model. This model measures the impact of tax policy change with revenue neutrality.

3.   Data and Observations

This study uses the time series data for 44 years (1975/76 – 2017/18). The summary statistics of the variables used in the model are presented in Table 1. The average growth rate of the Nepalese economy has remained 4.5 percent during this period but it is fluctuating between -3 and almost 10 percent. The population growth rate remained approximately 2.04 percent.

Going to fiscal variables, the tax GDP ratio has been 9.5 percent in average but it was rather low (5.1%) at the beginning but has been gradually increasing. This peaked-up to almost 22 percent in 2017/18. In the revenue composition, the share of VAT in total tax revenue is highest (31%); this was 20 percent at the beginning but has reached almost 38 percent now. Likewise, the share of income tax to total tax is also increasing from six to 28 percent. Contrary to this, the contribution of excise duties in total tax revenue has remained almost stable around 13 percent with minor fluctuation, standard deviation being 0.02. The trend is opposite in case of custom duties, its share in total revenue is gradually declining especially from mid 2000s mainly due to Nepal's accession to World Trade Organization (WTO), South Asia Free Trade Area (SAFTA), and Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Co-operation (BIMSTEC). During this period contribution by import duties in total tax revenue declined from about 35 to 17 percent.

Table 1: Summary of the major variables used in the study (1975/76 – 2017/18)

Variables	*# of observations*	*Mean*	*Std. deviation*	*Minimum*	*Maximum*
GDP growth rate	43	4.715	4.539	-3.00	9.700
Population growth rate	44	2.036	0.405	1.350	2.660
Tax GDP ratio	44	0.095	0.041	0.051	0.219
VAT to total tax ratio	44	0.312	0.037	0.200	0.376
Import tax to total tax ratio	44	0.251	0.049	0.170	0.346
Excise duties to total tax ratio	44	0.132	0.022	0.084	0.158
Income tax to total tax ratio	44	0.159	0.065	0.056	0.278
Annual rate of inflation (%)	44	8.655	4.505	-0.700	21.10
Capital formation to GDP ratio	44	0.203	0.043	0.120	0.340
Rate of investment growth	44	0.254	0.088	0.134	0.518

In this 44 years covered by the study, the average rate of inflation remained approximately nine percent, ranging from 4.5 to 21 percent. The capital formation to GDP ratio remained around 20 percent and annual growth of investment around 25 percent.

4. Results and Discussions

The results as presented in Table 2 show relative effectiveness of different taxes on economic growth. We start with Arnold (2011) model (equation 4), more specifically, the version adopted by Acosta-Ormaechea and Yoo (2012) (equation 5) and make its extension/ adjustment with inclusion of some other variables that reveal more explanatory power in case of Nepal as presented in Table 2. Firstly, we develop a baseline scenario and make some simulation analysis. The variables used in the model belong to four different categories: dependent variable, independent variables, control variable, and policy variables. For the details regarding dependent, independent, control, and policy variables, please see the Appendix A1.

Growth rate of GDP is the dependent variable in all the models used. Moreover, there are several independent, control, and policy variables in the model. Change in investment GDP ratio, change in capital expenditure to total expenditure ratio, change in population growth rate, change in tax GDP ratio, change in the share of income tax to total tax revenue, change in the share of import duties to total tax revenue, change in the share of excise duties to total tax revenue, change in the share of VAT to total tax revenue, time variable, GDP growth rate, investment growth rate, capital expenditure to total expenditure ratio, population growth rate, ratio of income tax revenue to total tax revenue, share of import duties to total tax revenue, share of excise duties to total tax revenue, and share of value added tax to total tax revenue are the independent variables. Likewise, the tax revenue GDP ratio is the control variable in the simulation scenarios. It is because we are trying to explore whether changes in the growth rate of revenue of a particular tax type, keeping the tax revenue ratio unchanged from the natural change would contribute to higher economic growth. Three simulation scenarios are developed in this regard:

i. No change in the income tax and excise duties but additional tax effort is from value added tax. In this case, the trend of the growth of import duties is also expected from value added tax (simulation 1)

ii. No change in the import duties and value added tax but additional tax effort is from income tax. In this case, the trend of the growth of excise duties is also expected from the income tax (simulation 2)

iii. Additional revenue generation is expected from value added tax and income tax; the growth trends of import duties and excise duties are merged to that of VAT and income tax, respectively (simulation 1 + simulation 2).

Control variable

T(t-1) = tax revenue GDP share of the previous year

Policy variables (introduced in simulations)

ImpToVAT = share of import duties to total tax revenue merged into VAT to total tax revenue share

ExcToIncTx = share of excise duties to total tax revenue merged into income tax to total tax revenue share

Among the tax variables, most of them are causing contraction in economic growth rate. Only in case of value added tax, the impact on growth rate is expansionary. This should be understood cautiously. The value added tax may not directly contribute for raising the growth rate but in higher growth spiral, the VAT collection also rises due to increased turnover in the market, therefore the positive association has been established the same applies to some extent in case of custom and excise duties. In case of income tax, the result is insignificant as well as inconclusive overall, raising tax GDP ratio is counter-productive to Nepalese economy as it is creating all contractionary effect expect in simulation where import and excise duties are adjusted with VAT and income tax, respectively.

Table 2: Growth and tax revenue composition correlates (Dependent variable GDP growth rate)

Independent variables	Arnold and Acosta/Yoo model	Baseline scenario (Present study model)	Simulation 1	Simulation 2	Simulation 3
ΔI	-25.09 (-0.91)				
CapExTotExRtCh		16.56 (1.17)	7.65 (0.52)	20.16 (1.41)	7.40 (0.49)
Δn	-9.22 (-0.44)	-1.53 (-0.08)	5.60 (0.26)	-13.53 (-0.73)	5.28 (0.24)
ΔT	-356.86 (-3.45)***	-386.1 (-4.24)***	-360.35 (-3.68)***	-387.17 (-4.16)***	95.07 (1.47)
ΔITs	14.87 (0.32)	45.17 (1.08)	-35.34 (-0.75)		253.45 (0.19)
ΔImpDs	96.62 (1.94)*	114.83 (2.32)**		109.62 (2.17)**	
ΔExcDs	108.07 (1.67)*	133.02 (2.04)**	53.23 (0.89)		
ΔVATs	65.02 (1.28)	91.47 (1.72)		77.61 (1.45)	344.81 (0.25)
t	-0.187 (-0.61)	-0.132 (-0.45)	-0.097 (-0.30)	-0.27 (-0.95)	-0.105 (-0.32)
G(t-1)	-0.406 (-3.43)***	-0.411(-3.64)***	-0.387 (-3.19)**	-0.369(-3.31)***	-0.388 (-3.11)**
I(t-1)	39.1 (0.87)				
CaExp/TotEx(t-1)		16.94 (1.61)*	14.28 (1.26)	14.83 (1.39)	13.60 (1.15)
n(t-1)	6.94 (1.06)	0.58(0.11)	4.30 (0.76)	-0.196 (-0.04)	0.598 (0.11)
T(t-1)	86.56 (1.31)	65.52 (1.11)	97.85 (1.59)	94.32 (1.67)*	4.11 (0.71)
Its(t-1)	-113.97(-2.24)**	-27.36 (-0.43)	-97.09 (-1.58)	30.57 (-0.46)	-96.89 (-1.54)
ImpDs(t-1)	202.61 (-2.95)***	-148.16 (-2.18)**	-252.29 (-4.58)***	-153.45 (-2.21)**	-250.30 (-4.42)**
ExcDs(t-1)	-144.21 (-1.81)*	-74.78 (-0.99)	-159.23 (-2.22)**	-108.38 (-1.47)	-157.45 (-2.12)**
VATs(t-1)	95.66 (-1.75)***	-29.41 (-0.54)	-94.33 (-1.87)**	-39.08 (-0.71)	-91.44 (-1.73)*
Constant	98.11 (2.46)**	56.54 (1.27)	114.83 (2.89)***	68.53 (1.53)	114.34 (2.81)***
Simulation policy variables					
ImpToVAT			11.63 (0.27)		-331.03(-0.25)
ExcToIncTx				62.88 (1.42)	53.96 (0.86)
R^2	0.73	0.75	0.69	0.73	0.70
Adjusted R^2	0.56	0.69	0.52	0.58	0.51

Note: Figures in parentheses are corresponding t-values of the coefficient estimated. *, **, *** refer the level of significance at 10, 5, and 1 percent, respectively.

Among the lagged variables, previous year growth rate has negative impact to this year's growth rate because of the fluctuating nature of growth pattern of growth of Nepalese economy. Furthermore, last years tax revenue has positive impact to the current year's growth this might be because of growth in public expenditure.

Last year's tax revenues of all types have negative impact to current year's growth performance because of all contractionary impacts of different tax types they bring in the economy. The impact of population growth is inconclusive and insignificant likewise, the impact of investment and capital expenditure are positve on growth but they require further strengthening to have significant impact.

The models presented are found accepted as the residuals left are found fully stochastic in nature, please refer to Appendix 2A.

5. Conclusion

The study applied an econometric model in measuring the short-term dynamic relationship as well as long-term association between revenue and growth performance of a typical developing economy. Taking the case of Nepal, additional tax revenue generation effort does not prove to be growth enhancing rather it has contractionary effect on GDP. However, in order to examine the effects of raising the revenue from particular tax type on GDP growth, we made the tax revenue to GDP ratio intact and developed three different scenarios. To put in other words, series of revenue replacement scenarios are developed. First, we implement a scenario of no change in the income tax and excise duties but additional tax effort is from value added tax. In this case, the trend of the growth of import duties is also expected from value added tax. Second, we implement a scenario with no change in the import duties and value added tax but additional tax effort is from income tax. In this case, the trend of the growth of excise duties is also expected from the income tax. In the third effort, we make a combination of the two scenarios, i.e. additional revenue generation is expected from value added tax and income tax; the growth trends of import duties and excise duties are merged to that of VAT and income tax, respectively.

The study concludes that Nepal's tax GDP ratio is itself at a higher side; therefore, any further effort to raise additional tax generates contractionary effects in the economy. The three different scenarios of revenue replacement developed also do not prove to be productive in making significant impact on GDP growth. However, raising the revenue share from import duties and revenue replacement of excise duties by additional income tax reveals some positive impact on economic growth. Raising the share of import duties might have worked positively to economic growth due to the import of capital goods and intermediate imports rather than the import of final consumption goods/services.

References

Acharya, S. 2010. Import Liberalisation and Revenue Replacement: Impacts in a Small Asian Developing Economy. *European Journal of Development Research*, Vol. 22 Issue 3, pp. 417-442, Palgrave Macmillan.

Acharya, S. 2016. Reforming Value Added Tax System in Developing World: The Case of Nepal. *Business and Management Studies*, pp. 44-63, RedFame.

Acharya, S. 2016. Role of Public Investment in Growth and Poverty Reduction in Transition Economies. *Journal of Reviews on Global Economics,*Vol. 5, pp. 310-326, LifeScience Global.

Acosta-Ormaechea, S. and Yoo, J. 2012. Tax Composition and Growth: A Broad Cross-Country Perspective. IMF Working Paper WP/12/257, International Monetary Fund.

Arnold, J. 2008. Do Tax Structures Affect Aggregate Economic Growth? Empirical Evidence form Panel of OECD countries. OECD Working Paper ECO/WKP(2008)51, Paris.

Arnold, J. M., Brys, B., Heady, C., Johansson, A., Schwellnus, C. and Vartia, L. 2011. Tax Policy for Economic Recovery and Economic Growth. *The Economic Journal*, 121:F59-F80, Royal Economic Society.

Asllani, G., Statovci, B. 2018. Effect of the Change in Value Added Tax on the Fiscal Stability of Kosovo. *Croatian Economic Association Zagreb*, 65(6), 513-540.

Daniel, B., Jeffrey, P. 2013. Investment Taxation and Portfolio Performance. *Journal of Public Economics*, 97(1), 245-257.

Gale, W. G., and Samwick, A. A. 2014. Effects of Income Tax Changes on Economic Growth, *SSRN Electronic Journal.*

Gasteratos, I., Karamalis, M. and Koutoupis, A. 2016. Shadow Economy Worsens Income Distribution. *International Journal of Economics & Business Administration*, 4(3), 80-92.

Gerson, P. 1998. The Impact of Fiscal Policy Variables on Output Growth, IMF Working Paper WP/98/1, IMF.

Nechaev, A., Antipina, O. 2016. Analysis of the Impact of Taxation of Business Entities on the Innovative Development of the Country. *European Research Studies Journal*, 19(1), 71-83.

Rimmler, M., Rose, M., Zller, D. 2017. Tax Reform for Tax Competition: Which Alternatives should be Used? *Croatian Economic Association Zagreb*, 56(11), 1079-1100.

Romero, D., Strauch, R. 2008. Public Finance on Long-term Growth in Europe: Evidence from Panel Data Analysis. European Journal of Political Economy, 24, 172-191.

Schraztenstaller, W., Kohler, T. 2015. The Impact of Tax on Economic Growth. Case Study of OECD Countries. OECD, Paris.

Widmalm, F. 1999. Tax Structure and Growth. Are Some Tax Better than Other? *Public Choice*, volume 107, pages199–219, Springer.

Appendix

Appendix A1: Variables in the model

In the given linear regression models, GDP growth rate is the dependent variable. The followings are the independent, control, and policy variables used in the model:

Independent variables

ΔI = change in investment GDP ratio

CapExTotExRtCh = change in capital expenditure to total expenditure ratio

Δn = change in population growth rate

ΔT = change in tax GDP ratio

ΔITs = change in the share of income tax to total tax revenue

ΔImpDs = change in the share of import duties to total tax revenue

ΔExcDs = change in the share of excise duties to total tax revenue

ΔVATs = change in the share of VAT to total tax revenue

t = time variable

G(t-1) = GDP growth rate of previous year

I(t-1) = investment growth rate of previous year

CaExp/TotEx(t-1) = capital expenditure share in total expenditure of the previous year

n(t-1) = population growth rate of the previous year

Its(t-1) = income tax revenue share in total tax revenue of the previous year

ImpDs(t-1) = Import duties share in total tax revenue of the previous year

ExcDs(t-1) = Excise duties share in total tax revenue of the previous year

VATs(t-1) = Value added tax share in total tax revenue of the previous year

Control variable

T(t-1) = tax revenue GDP share of the previous year

Policy variables (introduced in simulations)

ImpToVAT = share of import duties to total tax revenue merged into VAT to total tax revenue share

ExcToIncTx = share of excise duties to total tax revenue merged into income tax to total tax revenue share

Appendix A2: Residual Plots

Growth rates vs. residuals (simulation model 2)

Growth rates vs. residuals (simulation model 3)