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The Impact of Fiscal Policy on Economic Growth: Empirical Evidence from Four South Asian Countries

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THE IMPACT OF FISCAL POLICY ON ECONOMIC GROWTH:

EMPIRICAL EVIDENCE FROM FOUR SOUTH ASIAN COUNTRIES

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TASNIA SYMOOM

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THE IMPACT OF FISCAL POLICY ON ECONOMIC GROWTH: EMPIRICAL EVIDENCE FROM FOUR SOUTH ASIAN COUNTRIES

Submitted by Tasnia Symoom

APRIL 24, 2018

DEPARTMENT OF ECONOMICS
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The Impact of Fiscal Policy on Economic Growth: Empirical Evidence from South Asian Countries

Abstract

There is a constant debate about the effectiveness of fiscal policy on economic growth of developing countries. Policy makers in developing countries generally attempt to address socio-economic issues such as poverty, unemployment, hunger, poor investment, and illiteracy while adjusting the levels of public spending and determining tax rates. This thesis examines the impact of fiscal policy on economic growth in four countries of South Asia. For reasons of data availability I choose four of these countries – Bangladesh, India, Pakistan, and Sri Lanka – for the period 1980 to 2016. I use the Error Correction Model (ECM) and Autoregressive Distributed Lag (ARDL) model on pooled cross-section time-series data, and on panel data that can be handled by employing fixed-effects and random-effects estimators. Empirical results show that both government expenditure and tax revenue have no significant impact on real GDP growth in those South Asian countries. Moreover, real investment is strongly positively correlated with real GDP growth in these countries.

Chapter I

Introduction

Government intervention in economic activity around the world was relatively limited prior to the Great Depression of 1930s. In subsequent decades, however, particularly following Keynesian theory of aggregate demand, governments assumed greater role in output and employment stabilization. In developing countries, government involvement in the economy increased with goals to alleviate poverty and raise the economic growth rate. Government policy in most developing countries seeks to support market activity by addressing market imperfections. In addition, policies to increase investment and even production in the public sector have been popular.

Fiscal policy refers to a government's adjustment of spending and taxes to achieve certain macroeconomic objectives. Economic growth, price stability, balance of payments equilibrium, and exchange rate stability are the most important macroeconomic objectives that the governments primarily focus on (Blanchard, 2009). According to Abata et al. (2009), "... fiscal policy is central to the health of any economy, as government's power to tax and to spend affects the disposable income of the citizens, corporations as well as global business climate" (2009).

According to Keynesian theory of fiscal policy, an increase in public spending can increase aggregate demand leading to output growth depending on the size of expenditure multipliers. Keynesian economists tend to recommend increasing the public expenditure on socio-economic activities and public infrastructure to boost economic growth. Abdullah (2000) and Al-Yusuf (2000) argue that expansion of government expenditure contributes to the

economic growth of a country. On the other hand, Abu and Abdullahi (2010) conclude that increasing government expenditure slows down economic progress of a country. Taxation usually gets less attention in the analysis of the relationship between fiscal policy and economic growth of a country. Yet, taxation can affect economic activity independently of public expenditure besides serving as an important check on expenditure to keep budget deficit within limits. Therefore, to examine the impact of fiscal policy on economic growth and economic stability, both taxation and public spending could and should be considered separately.

Kraay and Severn (2008) conclude from their empirical study that the impact of expansionary fiscal policy on economic growth is much smaller in developing countries than in the developed ones. However, these authors also find different degrees of effectiveness of fiscal policy in the short run and long run in influencing aggregate demand and output in developing countries.

To examine the impact of fiscal policy on economic growth I focus on four South Asian countries that share similar goals of socio-economic development and also are members of the South Asian Association for Regional Cooperation (SAARC). Bangladesh, India, Pakistan and Sri Lanka are founding members of SAARC. I have narrowed down my research to these countries based on their similar geographical, economic and social background.

I first look at the economic background of these countries and examine their overall trends in taxation and government spending. These countries have recently graduated from being poor to attaining a (lower) middle income status according to the World Bank. From infrastructure development to guiding the private sector toward greater productive investment, the role of public policy in South Asia seems to be important. After a look at output growth and fiscal trends in the region, this research proceeds to review the literature on the effect of fiscal

policy on economic growth. Next, I develop two separate models to empirically analyze the growth effects of government spending and taxation. The development of the models is based on an understanding of the properties of macroeconomic data observed over 37 years as well as on an extensive review of empirical papers in the literature. This leads to a discussion of my empirical results. After a sequence of econometric tests on data and estimated results a main finding of this research indicates that neither government consumption expenditure nor tax revenue provides a significant impact on growth after controlling for a time trend. On the other hand, public and private investments make a large contribution to output growth. Finally, I conclude by exploring the policy implications of this research and suggesting extensions and topics for future research.

Chapter II

Economic and Fiscal Background of Sample Countries

2.1 Regional Trends

Macroeconomic trends in the four countries of South Asia have undergone significant changes from 1980s to 2010s. In the decadal average data (except average for seven years in the last period, of 2010-16, the most remarkable of these changes has been in the real GDP growth itself. Pakistan is the only country of the four that has experienced a slowdown: from the average growth of 6.9 percent in the 1980s to 3.9 percent during the 2010s. For the rest, the overall trend (led by India) shows an upswing from 4.4 percent to 6.6 percent (unweighted average) over the nearly 30 years of time. Population-weighted average growth has been even higher because of the higher GDP growth in India, a country that accounts for about 78 percent of the total population of these four countries.

If we consider possible explanations for the upward trend of GDP growth within the framework provided by neoclassical growth theory, investment as a percentage of GDP stands out as one of the most contributing factors. Investment in both physical and human capital has grown substantially for the overall region. The rising investment-to-GDP (I/Y) ratio once again is led by India, from 22 to 31 percent from the first to the last period. The (unweighted) average I/Y ratio for all countries over the entire period of analysis stands at 23 percent. Bangladesh and Sri Lanka have stayed close to this mean whereas Pakistan's relatively lower decadal average has fallen even further from 17 percent during the 1980s to 14 percent in 2010s. Thus the strong correlation of investment with output growth is clearly observed in the data and matches with the

prediction of the Solow growth model for countries that seem to be moving to their respective steady states.

Growth trends of individual countries also seem to correlate positively with their openness in trade. From a low base of openness (19 and 14 percent of GDP in the 1980s) Bangladesh and India have made remarkable progress to increase their openness to 43 and 49 percent respectively during 2010s. Export leaders have been textiles and garments for Bangladesh and services including information technology services for India. Pakistan's trade has slipped a bit from 35 to 31 percent of GDP, but Sri Lanka has experienced a painful decline from 76 percent in the 1990s to just 50 percent during 2010s. Foreign direct investment into South Asia has grown over time, yet for all countries net FDI inflows have remained within 2 percent of GDP. It seems there is large potential for FDI to grow under a more conducive policy environment.

This brings us to fiscal trends in South Asia, a focus of this study. Tax revenue of these four central governments in South Asia average 11 percent of GDP with Bangladesh on the lower end of the scale. But over time tax revenue has converged to between 9 and 11 percent of GDP for all the countries. It is found that, government consumption expenditure as well as the trend toward convergence is visible. India, Pakistan, and Sri Lanka spend between 10 and 11 percent of GDP with Bangladesh again an outlier with only 5 percent. This means the budget deficit resulting from recurrent expenditures and taxes has been manageable for these countries except for Sri Lanka where the deficit has averaged about 5 percent of GDP, twice as large as in Pakistan, the country with the second largest deficit relative to GDP. The international debt situation also reflects the trends in budget deficit. After a long civil war ended in Sri Lanka in 2009, the deficit began to fall which by 2016 decreased the debt ratio to 72 percent of GDP as

compared to around 97 percent for most of the previous 30 years. Pakistant has had its debt at a relatively high and steady level of about 77 percent. Bangladesh debt levels are comparatively low though consistent data are lacking for this country. In the case of India, a near crisis in debt during the early 1990s has given way to a much more manageable ratio of 51 percent of GDP in 2010s.

To sum up, the macroeconomic situation in South Asia has remained fairly stable and relatively optimistic. Growth pickups are observed in all countries except in Pakistan. These countries have been diversifying their economies away from agriculture in their own ways. In particular, India's growth in output and employment is more visible in services and construction rather than in manufacturing, a sector in which Bangladesh has achieved much progress over the last few decades. Countries have reduced poverty at different rates mostly because of GDP growth, yet growth has also become associated with a rising concentration of income and wealth. The following few pages review macroeconomic situation on a county by country basis.

2.2 Bangladesh:

Bangladesh has moved up from low-income status to become a (lower) middle income economy since 2015. Recent records and future prospects suggest that the country can qualify for an upper middle income label by 2030 if it can raise its growth of real GDP to 8 percent per year over the next 15 years (Ahmed, 2016). However, Bangladesh faces several socio-economic challenges. The country remains one of the most overpopulated countries and a weakly governed one. Its readymade garment exports and remittance receipts from Bangladeshi workers working abroad have been the two major sources of income for millions of households. Its total exports and imports have risen at fairly high rates, ranging from 18 percent to 46 percent from 1980 to2016.

Tax management in Bangladesh is regarded as poor and inefficient. The ratio of tax revenue to GDP is around 8 to 9 percent which is much lower than in most of the developing countries. Tax revenue depends mostly on trade and consumption taxes and to a much smaller extent on personal income taxes which contribute just 1 percent of GDP. Five to six percent of the households at the high income end are able to escape with a light tax payment because of corruption and loopholes, which deprives the country of greater potential investment in infrastructure in physical and social capital (Ahmed, 2016). Moreover, exports of readymade garments and land and stock holdings receive high tax incentives while banking and Information and Communication Technology get penalized at a higher rate (Ahmed, 2016).

Table 1: Trends in Fiscal Policy variables and GDP of Bangladesh, 1980-2016

Period Average	1980-1989	1990-1999	2000-2009	2010-2016
Tax	5.94%	6.61%	7.06%	8.61%
Deficit	-2.51%	-0.45%	0.75%	1.05%
Consumption	88.02%	81.47%	74.99%	73.22%
Expenditure	4.43%	4.69%	5.14%	5.28%
Investment	16.13%	19.35%	25.26%	28.20%
FDI(net inflow)	0.01%	0.12%	0.68%	1.25%
Trade Openness	18.835	24.07%	34%	43.46%
RGDP Growth	3.55%	4.71%	5.55%	6.33%

Source: World Bank, 2018

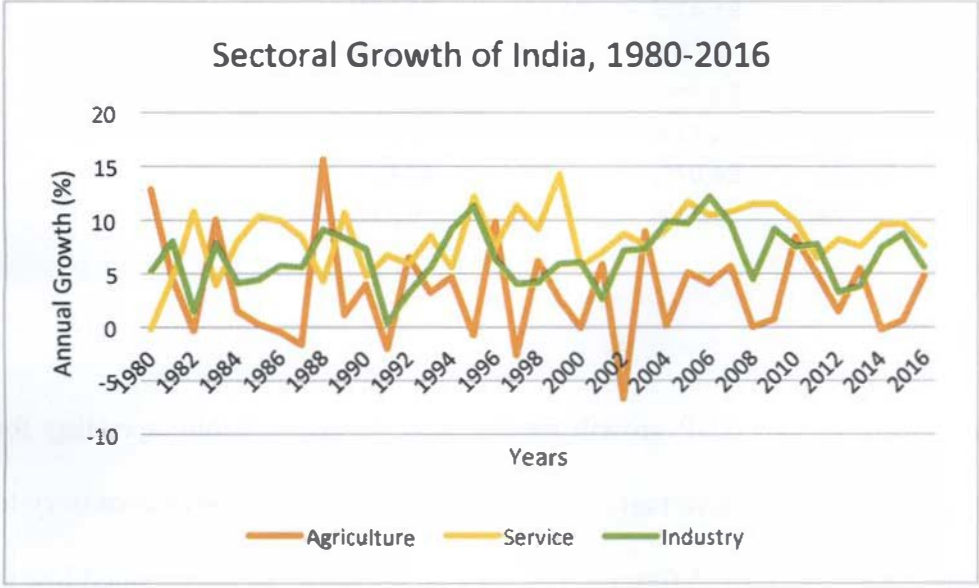
For attaining 8 percent annual GDP growth for the next 15 years, public spending for infrastructure needs to grow at a much more rapid pace (Ahmed, 2016). This seems necessary to attract private investment, particularly from foreign investors. FDI inflows have remained low at 1.25 percent of GDP to enhance growth. Investment away from infrastructure development has been costly for Bangladesh. Resource diversion toward setting up and managing State Owned

Enterprises (SOEs) and public sector banks has left the public enterprise management corrupt and inefficient and has required huge public subsidy from the Treasury (Ahmed, 2016).

2.3 India

India has liberalized its economy substantially since the 1990s by allowing market forces to assume a much bigger role in production. But India has also been dealing with tenacious fiscal deficit since the mid-1980s. To boost economic growth the Indian government restructured the tax system which allowed a transfer of resources from the private to the public sector to gear up industrialization (De, 2012). However, poor public sector management failed to raise growth as the annual industrial growth barely increased from 5.24 percent to 5.59 percent over the 1980-2016 period (figure 1). The fiscal policy reform turned out to be inefficient. At the same time, the public debt and fiscal deficit also increased.

Figure 1: Sectoral Annual Growth of India, 1980-2016



Source: World Bank, 2018

Higher public debt and persistent fiscal deficits have been recurring features of India's fiscal system. The fiscal Responsibility and Budget Management (FRBM) Act was implemented in 2004 to achieve targeted reductions in the fiscal deficit over a period of time (Anantha & Gayithri, 2016). To commit to attaining a reasonable fiscal balance, the Reserve Bank of India, the country's central bank, was assigned to oversee the implementation of this Act (Anantha & Gayithri, 2016).

Table 2: Trends in Fiscal Policy variables and GDP of India, 1980-2016

Period Average	1980-1989	1990-1999	2000-2009	2010-2016
Debt	51.45%	50.38%	60.16%	51.18%
Tax	9.91%	9.29%	9.97%	10.63%
Deficit	-1.60%	-1.28%	-0.53%	-2.41%
Consumption	68.28%	62.55%	56.80%	57.35%
Expenditure	10.99%	11.33%	11.05%	10.79%
Investment	22.03%	24.99%	30.62%	31.32%
FDI(net inflow)	0.04%	0.39%	1.58%	1.75%
Trade Openness	13.96%	20.88%	38.79%	49.42%
RGDP Growth	5.69%	5.77%	6.89%	7.34%

Source: World Bank, 2018

While high government expenditure and constrained tax revenue result in a rising gross fiscal deficit in the Indian economy (Mallick, 2013), a rapid reduction in the deficit through expenditure slowdown can also apply unnecessary brakes on economic growth (Anantha & Gayithri, 2016). Table 2 shows that investment has increased from 22 to 31 percent of GDP in these 37 years which is likely to be significantly correlated with growth acceleration in the second half of our review period.

2.3 Pakistan:

Sustainable economic development has been an important objective of every developing country including Pakistan. Pakistan has been dealing with macroeconomic problems like poverty and unemployment continuously. According to the Asian Development Bank, 29 percent of the population in Pakistan lives below the national poverty line (ADB, 2017). This is now the highest headcount poverty in South Asia. Around six percent of the total population is fully unemployed and a much higher fraction underemployed, especially in agriculture. Policy makers need to design fiscal policy to address growth and employment issues on a concerted basis.

The government of Pakistan has been collaborating with the IMF and the World Bank on making reforms to tackle price instability and balance of payments deficit (Haq, 2003) through the use of fiscal and monetary policy. However, in order to reduce the fiscal deficit, development and investment expenditures have been cut which has led to a sluggish output growth and continued increases in unemployment over time. The Real GDP growth rate of 3.9 percent for 2010-16 (Table 3) remains the slowest in South Asia.

Table 3: Trends in Fiscal Policy variables and GDP of Pakistan, 1980-2016

Period Average	1980-1989	1990-1999	2000-2009	2010-2016
Debt	78.77%	76.38%	79.08%	74.03%
Tax	13.14%	12.91%	9.92%	9.58%
Deficit	-2.73%	-4.03%	-1.39%	-1.39%
Consumption	79.21%	72.33%	76.81%	80.70%
Expenditure	12.47%	10.80%	9.06%	10.65%
Investment	16.98%	17.04%	16.28%	13.52%
FDI(net inflow)	0.33%	0.88%	1.72%	0.70%
Trade Openness	34.51%	36.80%	32.38%	30.81%
RGDP Growth	6.86%	3.98%	4.49%	3.87%

Source: World Bank, 2018

Pakistan has reduced the size of its fiscal deficit as a percentage of GDP from -2.73 percent to -1.39 percent over the years 1980 to 2016 (table 3). Public debt has also decreased slightly from 78.8 percent to 74.0 percent though its level still poses a significant burden on the budget (table 3). The interest bill for external debt takes away one-third of the tax revenue (Lorie, 2006) in Pakistan. IMF research suggests a non-linear relationship between the fiscal deficit and GDP growth in a large sample of countries and recommends that the deficit be maintained below a threshold level for growth reasons. The IMF argues that reaching the threshold starting from a high fiscal deficit can positively affect long run economic growth. According to the IMF, the same rule applies to public debt in Pakistan (Lorie, 2006)

2.5 Sri Lanka

Sri Lanka has struggled with the problem of poverty reduction and government policy inefficiency. Internal conflict between the military and Tamils was an add-on to these macroeconomic problems. The internal conflict pushed Sri Lanka almost to the bankruptcy through huge fiscal deficit and public debt (Padda, 2011). Though the 30 years of inner conflict ended in May 2009, the government has had to make enormous efforts to get the economy out of the effect of this conflict. In recent years, the government's emphasis on output growth as a goal has led to increased investment in infrastructure (IPS.lk, 2016).

Table 4: Trends in Fiscal Policy variables and GDP of Sri Lanka, 1980-2016

Period Average	1980-1989	1990-1999	2000-2009	2010-2016
Debt	96.58%	93.95%	95.62%	71.87%
Tax	19.02%	17.01%	13.79%	11.19%
Deficit	-7.68%	-4.36%	-3.50%	-3.61%
Consumption	77.96%	74.08%	69.75%	68.22%
Expenditure	9.09%	9.93%	13.58%	8.34%
Investment	25.86%	24.61%	23.47%	27.17%

FDI(net inflow)	0.75%	1.21%	1.31%	1.14%
Trade Openness	67.98%	76.31%	72.67%	50.35%
RGDP Growth	4.15%	5.26%	5%	6.16%

Source: World Bank, 2018

The consistent and high public debt and budget deficits in Sri Lanka indicates the need for the government to make a serious move to fiscal consolidation. Table 4 shows that the public debt has been decreasing over the years 1980 to 2016, from 96.6 percent to 71.9 percent, yet a reduction of the debt burden could partly address the drag on economic growth. Fiscal deficit in Sri Lanka is higher than in other developing countries of South Asia: Bangladesh, India, and Pakistan. The Institute of Policy Studies (IPS) of Sri Lanka held the weak finance management system of Sri Lanka responsible for the interrelated problems constraining investment and productivity across Sri Lanka (IPS.lk, 2016). The IPS notes that the government has approved a significant tax exemption to attract FDI inflow. In Figure 4, we see that the FDI to GDP ratio has increased to 1.14 percent in the last ten years; however, the tax revenue has decreased to 11.4 percent over the years which is leading to fiscal deficit more.

Trade openness as a percentage of GDP shows a decrease from 68 to 50 percent over the years 1980 to 2016 which is a result of Sri Lanka's sharp increase of Para-tariff (IPS.lk, 2016). However, the GDP growth of Sri Lanka has risen from 4.2 to 6.2 percent during these 37 years (table 4). Growth could be expected to increase more if fiscal deficit were lower and expenditure on infrastructure could be increased to induce greater investment and employment.

Chapter III

Literature Review

One way to look at the literature on the effects of fiscal policy on economic growth might be to review the predictions of classical theory and Keynesian theory on this subject. The classical theory stresses restrain on government intervention because the economy is best left to run on self-correcting mode. On the other hand, Keynesian theory considers government intervention through taxation and expenditure policies as a desirable force that helps to stabilize output and possibly enhance economic growth. Fontana (2009), in a review of related literature, concludes that there is nothing closely approaching an agreement among modern theories on the effects of fiscal policy. In addition, he argues that these theories of fiscal policy are poorly supported by empirical evidence and case study analysis.

Do country studies show different results and do the effects differ between the long run and short run? The literature indeed shows mixed results about the impact of fiscal policy on economic growth with some empirical studies indicating a significant positive relation and others showing no effects or small but insignificant effects. Gheorghe et al. (2016) took Romania as their case study to examine how these policies can ensure fiscal sustainability and long term sustainable economic growth and found that considerable fiscal consolidation effort and deep structural reform made Romania exit the excessive deficit pattern in 2011. The authors indicate that large increases in the state budget for investment played a significant role behind Romania's overcoming the recession.

Zagler and Durnecker (2003) survey the literature on the growth effects of fiscal policy where they develop a unifying framework to analyze long-run implications of policy though they

also consider fiscal policy as a short run instrument for economic stabilization. They conclude that education expenditure and public infrastructure investment have a positive relationship with economic growth whereas tax policy, and research and development expenditure have a greater influence on innovation driven growth.

Finally, Montiel and Serven (2006) try to explore the reasons for the ineffectiveness of fiscal policy reform that developing countries pursued in the 1990s. They find that the policy reform actually brought slow growth and frequent financial crises in the reform countries. While examining the fiscal, monetary and exchange rate policies across developing countries the authors find that a lack of depth in the reform agenda, and its failure to plan for possible macroeconomic shocks hurt economic growth. Insufficient attention to complementary reforms outside the macroeconomic sphere also prevented fiscal policy from being effective. In his support of a similar conclusion, Doraisami (2013) points out that specific structural and industrial factors like a high degree of labor market informality, a low number of registered taxpayers, continuation of previously approved tax cuts, and major spending on infrastructure projects with relatively lower returns are also responsible for the fiscal programs being less effective. The author recommends that developing country governments consider country specific structural and institutional features when using fiscal policy as a tool of economic stabilization.

Capital investment has been found to be profoundly significant for the growth of an economy. As claimed earlier by Zagler and Durnecker (2003), Sing (2015) also finds a positive relationship between investment in capital projects and economic growth. Ali et al. (2010) study fiscal policy and growth in Pakistan and find that there is a long-run relationship between overall fiscal deficit and economic growth there. While the deficit is found to be negatively and

significantly related to growth, Ali et al. (2010) also discover a positive effect up to a threshold. Beyond the threshold, fiscal deficit lowers economic growth. This also indicates benefits from reducing non-productive government expenditures. In a study of Bolivia, Machicado and Estrada (2012) find that fiscal policy alone cannot stimulate growth but should be accompanied by public capital and schemes to achieve productivity boosts.

The effect of fiscal policy on growth can vary across time periods depending on the chronology of politics and the prevailing economic situation. Day and Yang (2010) use a Keynesian growth model and take a long-term view over 70 years from the 1930s to 2007 to find that the long run growth effect of increasing government spending or decreasing tax rely on the marginal propensity to consume and invest, and the effect can be positive under certain circumstances.

On the other hand, Kukk (2007) finds there is not much of an impact on growth from either short-run fiscal policy or long-run expansionary policy. The author, however, draws attention to the recognition that changes in different types of expenditure and revenue have varying effects on growth in the long run. Using an endogenous growth model with perfectly elastic labor supply, Park (2009) investigates the role of Ramsey economic policy in a growth process and shows that, even though government spending is productive in the short run, a rise in capital accumulation and economic growth is not feasible over the long run.

Growth effects of fiscal policy have been studied in the case of Nigeria by several authors. Igwe et al. (2015) studies the effects separately for capital expenditure, recurrent expenditure, and direct income tax for the years 1970 to 2012. Even though causality was hard to establish, the authors found a positive long run relationship of growth with the two expenditure types. On the other hand, direct income tax was found to be inversely related with growth.

Osualai and Jones (2014) find that capital expenditure has short run equilibrium relationship with growth in Nigeria whereas non-oil tax revenue and government debt do not exhibit such a relationship. The authors recommend a commitment to strong fiscal responsibility, and a stronger transparency system in fiscal institutions, and that fiscal policy should be complemented with monetary policy.

Gemmell et al. (2011) use 30 years of data to test for aggregate short and long run growth impacts of fiscal policy in OECD countries. Bridging the short-run models in the literature in which effects occur fast, and long-run models where short-run dynamics are usually left unexplored, these authors present interesting evidence from their regressions. Gemmell et al. (2011) find that the long-run growth effects discussed in the literature actually take place rapidly, but also that the frequent fiscal changes that are observed in OECD imply that persistent movements in growth rates are rare. They recommend work on more detailed breakdown of fiscal variables to have clearer confirmation of their results.

Sectoral output growth has also caught attention of researchers while analyzing the influence of fiscal policy. Osinowo (2015) focuses on the impact of fiscal policy on the sectoral output growth of Nigeria and finds a positive relationship between fiscal expenditure and output in all the sectors except agriculture. His finding suggests that inflation rate and sectoral outputs are negatively correlated except in manufacturing. The author claims that imposing a uniform and economy-wide fiscal policy is difficult in Nigeria because of varying output responses to fiscal expenditure. Sector-specific fiscal policy should thus be developed within an overall fiscal framework.

There is significant amount of research examining government recurrent expenditure and its relationship with economic growth. Asaju et al (2014) find that ineffective implementation of

fiscal policy due to a lack of budget discipline and an increasing share of recurrent expenditure can explain slower aggregate growth and uneven sectoral growth in Nigeria. To increase policy effectiveness the authors recommend a strict budget discipline, policy consistency, and efforts to reduce corruption. In the case of Ghana, Soli and Harvey (2008) show that government recurrent expenditure, government capital expenditure and taxes on international trade exert a significant impact on growth whereas changes in taxes on domestic goods and services, taxes on international trade, and taxes on income and property affect private capital investment. They find a weak correlation between private investment and economic growth suggesting that the Ghanaian private sector has not developed enough to contribute to the economic growth of Ghana.

Todorova et al. (2014) show, based on their econometric analysis, that Bulgaria and the other newer member states of the European Union would benefit from a reduction of public spending to ensure highest economic growth. On the other hand, Ocran (2009) studies South Africa for the period 1990-2004 and finds that among fiscal variables, government consumption and gross fixed capital formation both have a positive impact on growth but surprisingly the size of the impact of consumption expenditure is even larger.

Literature also indicates results for direct taxation, and tax cut (pre-announced or not). Friedman et al (2015) study Israel during the 2000s when tax cuts were pre-announced and look at the effect of reductions in public debt. Taking domestic productivity into account, they construct a model which shows that a credible announcement of future tax cut has an expansionary effect on productivity, whereas an announcement of a lower public debt has a contractionary effect but it enhances productivity in the long run. In addition, Todorova et al (2014) find that higher taxes slow down economic growth. Abdon et al (2014) study developing

Asia where the evidence shows that property taxes have a greater effect on growth than do direct taxes. They also find significant favorable impact of education expenditure on growth.

Research on fiscal policy also explores its impact on sociopolitical indicators of an country such as inequality, poverty, election, and corruption. Haynes and Vidal (2015) examine the contribution of fiscal policy to reduce economic inequality in the United Stated using data from 1976 to 2006. They find that the variety of fiscal policy tools such as cash assistance, unemployment insurance and corporate taxes have significantly lessened economic inequality among various economic groups. They also suggest future research to consider the fiscal policy of state and local governments. Ayala and Jurado (2011) looked at income inequality and poverty issues in the regions of Spain and found that fiscal policy induced growth had uneven impact on poverty across regions even though growth contributed to a long run improvement of lower income percentiles of population. These authors suggest that the transfer of responsibility to the territorial governments had a better chance to address poverty.

Schuknecht (2000) examines fiscal policy cycle of 24 developing countries from the year 1973 to 1992 to check whether to see if elections have any significant impact on fiscal policy or not. The result shows that elections are times when public expenditure increases which raises the vote share of the political party in power. Only a strong institutional mechanism can strengthen fiscal control and stop opportunistic policy making around elections. Ghosh and Neanidis (2011) focused on corruption and find that the resulting resource diversion from productive purposes accounts for ineffectiveness of fiscal policy in growth. Corruption leads to a false claim of an increase in government spending and reduces the productivity of "effective" government spending.

Finally, in both developed and developing countries, governments allot a portion of their budget for social spending. Connolly and Li (2016) examines the effect of fiscal policy variables on the economic growth of 34 OECD countries over the period 1995 to 2011. Using panel data, they find that public social spending has a significant negative impact on economic growth whereas government consumption shows no significant impact on growth subsequently.

CHAPTER IV

Methodology and Data

This chapter develops an empirical model to understand the relationships between fiscal policy variables and economic growth in four countries of South Asia. The method is discussed in a sequence of steps that will be followed in Chapter V to explain the properties of data and to arrive at results and interpret them correctly.

4.1 The Model:

The purpose of this study is to examine whether and how government expenditure and tax revenue—the two main instruments of fiscal policy—impact economic growth of the developing countries in South Asia. Several other factors that seem important in growth will also be included as control variables. Some of these factors include capital investment, household consumption, human resources, and political stability. The formulation of my models is based on (a) the literature reviewed in the last section and (b) an understanding of growth and fiscal performance of the countries as described in chapter 2. To allow for the possibility that public expenditure and government revenue could have somewhat different relationships with growth, two different models will be studied. I use the same control variables for the two models except where there is a compelling reason not to do so. According to the endogenous growth theory, economic growth is primarily the result of endogenous factors and not external forces and the long run growth rate of an economy also depends on policy measures.

To develop a model in which fiscal policy can have significant growth effects, Aschauer (1989) and Barro (1990), look at public investment for a cross section of countries. Barro (1990, p.S124) concludes that once total investment to GDP ratio is held constant, "there is no separate

effect on growth from the breakdown of total investment between private and public components." Aschauer (1990) finds the public investment multiplier to be greater than one whereas the multiplier for general recurrent expenditure is less than one. Because of data availability constraint on long time series for South Asian countries, I had to combine sectoral investments into total investment for both public and private sectors. This seems a satisfactory resolution to data problems in light of Barro's (1990) findings that not much insight can be gained by studying the impact of public and private investment on growth separately. Many subsequent studies have also shown a substantial impact of public investment compared with no impact or a negative impact of government recurrent spending. In this thesis therefore the two variables that are most relevant for a study of growth are total investment (which includes public investment), and government consumption expenditures.

For these South Asian economies, the correlation between tax revenue and government consumption or investment is not very high. The t-statistics value is -0.16 which indicates weak relation between these two fiscal variables. While taxation remains the most important source for financing expenditures, several other factors have been important at different periods of time. In particular, foreign aid during the 1980s and 1990s, and foreign remittances more recently have been prominent. The question arises whether high and rising taxes create major disincentives in production and growth in South Asia. Thus, this study models the possible effects of tax revenue separately from the model for government expenditure.

The relationships between government expenditure and growth, and tax revenue and growth can only be examined after controlling for several relevant factors that also influence economic growth. Because the dependent variable in my models is total real GDP or its growth, a rising population that naturally leads to larger output needs to be included in the models.

Another popular control variable in most analyses of economic growth is trade openness. Exports represent world demand for a country's products. Exports tend to raise efficiency in domestic production because of the competition the domestic suppliers must face with those in other countries. On the import side, South Asian countries import significant amounts of capital goods and intermediate products that lead to higher output. Trade openness is expected to have a positive relationship with output and is included in my models.

Finally, political factors can also be important in economic growth. Instability in political systems or governance can increase uncertainty of future returns to current investment and cause output reduction.

The arguments put forward above about relationships between output growth and explanatory variables can be summarized under equation (1) and equation (2) as given below

$$RGDP_{it} = F(GOVEXP,\ INV,\ POP,\ TRADE, POLISTAB) \qquad (1)$$

$$RGDP_{it} = F(TAXREV,\ INV, POP,\ TRADE, POLISTAB). \qquad (2)$$

Here, GOVEXP is general government expenditure commonly understood as government consumption, INV is investment proxied by gross fixed capital formation, POP is total population, TRADE is trade openness, POLISTAB is political instability (where political instability =1, otherwise 0) and TAXREV is tax revenue. Since many of the macro time series display a time trend, I also add t as the time variable consisting of years from 1981 through 2016. Moreover, most macro-economic variables at levels tend to show geometric growth and require taking logarithms to linearize their movement through time.

$$lnRGDP_{it} = \beta_0 + \beta_1 ln\ GOVEXP_{it} + \beta_2 \ln INV_{it} + \beta_3 \ln POP_{it} + \beta_4 TRADE_{it} + \beta_5 POLISTAB_{it} + t + \varepsilon_{it} \qquad (3)$$

Taking first differences of the variables so as to estimate regressions of growth per year, we have the following equations

$$\Delta LnRGDP_{it} = \beta_0 + \beta_1 \Delta LnGOVEXP_{it} + \beta_2 \Delta LnINV_{it} + \beta_3 \Delta LnPOP_{it} + \beta_4 \Delta TRADE_{it} + \beta_5 POLISTAB_{it} + t + \varepsilon_{it} \quad (4)$$

where the two non-logarithmic variables are trade openness which is a ratio of total trade to GDP and political instability which is a dummy variable.

Analogous to a model with government expenditure is our model with tax revenue, as given below:

$$\Delta LnRGDP_{it} = \beta_0 + \beta_1 \Delta LnTAXREV_{it} + \beta_2 \Delta LnINV_{it} + \beta_3 \Delta LnPOP_{it} + \beta_4 \Delta TRADE_{it} + \beta_5 POLSTAB_{it} + t + \varepsilon_{it} \quad (3)$$

The data used in the models are Real GDP, general government final consumption expenditure, investment, total tax revenue, total population, trade openness as a percentage of GDP, and an indicator of political instability. Real GDP, investment, and total tax revenue are measured in constant 2010 U.S dollars. Trade openness is the sum of exports and imports of goods and services measured as a share of GDP and political instability is a dummy variable.

4.2 Explanatory Variables:

The models in this study use the following variables, with logarithms or annual changes suppressed. The source of data for most variables is the World Development Indicators. This is available from a free website maintained by the World Bank (databank.worldbank.org). The United Nations Conference on Trade and Development (UNCTAD) was the source of trade and aid data. The variable included are:

RGDP = real GDP, measured in millions of constant U.S. dollars (2010)

GOVEXP = Government consumption, or "general government final consumption expenditure," in millions of constant U.S dollars (2010)

INV = private and public investment as measured by gross fixed capital formation, in millions of constant U.S dollars (2010)

TAXREV = Total tax revenue,

TRADE = Exports and imports of goods and services as a percentage of GDP, and

POLISTAB = political instability is a dummy variable that is equal to 1 is there is political instability, otherwise it is 0

GOVEXP measures recurrent expenditure including compensation of employees, and purchases of goods and services for administrative purposes. It also includes expenditures on national defense and security but excludes military expenditures that are part of government capital formation. The data are in constant 2010 U.S dollars. INV is also measured in 2010 U.S dollars and includes land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchase; and the construction of roads, railways, and structures such as schools, offices, hospitals, commercial and industrial buildings. According to the 1993 System of National Accounts (United Nations), net acquisitions of valuables are also considered part of capital formation. According to Soli et al. (2008), the major difference between productive and non-productive expenditures is that the productive expenditure ends up in production function of the private sector and boosts growth whereas non-productive expenditure goes to their utility function. As wages, salaries and other recurrent expenditures crowd out investment, they may negatively affect output growth.

With regard to taxation, Soli et al. (2008) maintain that tax revenue can have either positive or negative relation with economic growth depending on whether it encourages or discourages saving (investment). If taxes are heavily distortionary they will have an adverse impact on growth. But if their net impact is less or not distortionary, they may enhance growth. The total tax revenue data are also measured in constant 2010 U.S dollars, available from the World Bank database.

Total population, a control variable in the regression, counts all residents regardless of legal status or citizenship (World Bank, 2018). The relationship between population and economic growth is not clear a priori. In general, population growth can stimulate economic growth by adding to the supply of workers as well as by creating greater demand for goods and services. On the other hand, faster growth of population can also have a negative impact on output growth by possibly causing a slower capital accumulation as well as by dragging down productivity growth (Sheffield Political Economy Research Institute, 2014). Therefore, population could have a significant positive or negative effect on economic growth. The sign of its coefficient is ambiguous a priori.

Next, trade openness is the sum of exports and imports of goods and services measured in dollar terms as a percentage of GDP. According to Bourdon and Vijil (2017), countries which are open to trade and export higher quality goods experience higher growth. In other words, the higher the quality of the export products of a country, the greater is economic growth of that country. As they argue, however, low quality export basket can impact economic growth negatively.

Finally, the model includes political instability as measured by whether a military coup, a war or a major civil unrest occurred in a particular year. In this study political instability is a

dummy variable with the value 1 assigned to instability and 0 otherwise. Data on this variable was extracted from British Broadcasting Abbreviation.

It is possible that the accumulation of human capital can be as significant as the accumulation of physical capital in growth. The Growth literature indicates the use of several alternative ways to represent human capital of which net school enrollment rates and average years of schooling for the adult population have been the most prominent. However, due to the data unavailability for most of the earlier part of the sample period and some missing values even for more recent years, this variable has been excluded to preclude bias due to mismeasurement.

Another important consideration in the development of my empirical growth model is the possibility of endogeneity in the key variables, namely government expenditure. A higher GDP growth can lead to greater tax revenue and greater government expenditures. If so, this will require the use of an instrument for our fiscal policy variables. The instrument must be relevant as well as exogenous. Instrument relevance implies that the instrument should be correlated with the endogenous explanatory variable. Instrument exogeneity requires that this variable should be uncorrelated with the error term. I consider foreign aid as a possible instrument because aid boosts public expenditure and to the extent aid works through government budgets to affect output it can be expected to have little correlation with the error term. In this study, foreign aid is the sum of net official development aid provided by other governments and by multilateral development agencies such as the World Bank. Net official aid consists of the disbursement of loans and grants which includes loans with a grant element of at least 25 percent. These data are in constant 2010 U.S dollars.

The first stage equation under the instrumental variable (IV) approach estimates the suspected endogenous variable LnGOVEXP against LNAID and other exogenous variables in the model as shown below:

$$LnGOVEXP = \mu_0 + \mu_1 LNAID_{it} + \mu_2 LNINV_{it} + \mu_3 LnTRADE_{it} + \delta_{it} \ldots . (6)$$

The estimated LnGOVEXP is then substituted in the original GDP equation for an unbiased estimate of the parameters:

$$\Delta LnRGDP_{it} = \beta_0 + \beta_1 LnGOVEXP_{it} + \beta_2 LnINV_{it}$$

$$+\beta_3 LnPOP_{it} + \beta_4 TRADE_{it} + \beta_5 POLSTAB_{it} + t + \varepsilon_{it} \quad \ldots\ldots\ldots\ldots (7)$$

Two important considerations can be noted here. First, if the spending variable is not found to be endogenous, no other instrument will be required. Alternatively, if the aid variable is not exogenous but is found to be correlated with the growth variable, then aid directly belongs in the growth model. Many papers in the literature do explore aid's effect on growth directly.

Here, Table 5 will show the independent variables and the expected sign:

Table 5: Variables and the expected signs:

Variable	Expected sign
Total Expenditure	Positive (+)
GFCF	Positive (+)
Foreign Aid	Positive (+)
population	Positive (+)/Negative (-)
trade openness	Positive (+)/Negative (-)
Political Instability	Negative (-)
Tax revenue	Positive (+)/Negative(-)

4.3 Data type and Sources:

This study uses panel data for four countries—Bangladesh, India, Pakistan, and Sri-Lanka-—each with 37 yearly observations from 1980 through 2016. The data were collected from the World Bank data bank and UNCTAD (United Nations Conference on Trade and Development) sources. The summary statistics of Real GDP (LNRGDP), total government expenditure (LNGOVEXP), gross fixed capital formation (LNINV), total population (LNPOP), trade openness (TRADE), political Instability (POLISTAB), foreign aid (LNAID) and total tax revenue (TXREV) are presented in Table (6) below:

Table 6: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
lnrgdp	148	11.0523	.566452	10.13585	12.3918
lngovexp	148	9.951948	.6653094	9.021548	11.4357
lninv	148	10.36792	.6251216	9.472429	11.8731
trade	148	40.04138	19.60973	12.35209	88.63644
lnaid	148	9.189198	.2842242	8.465517	9.726768
lnpop	148	18.68135	1.436369	16.50655	21.00405
polstab	148	.2162162	.4130613	0	1
txrev	100	11.11287	2.625332	6.61116	19.02083

4.4 Statistical Properties of Panel Data:

According to standard econometric theory, the model variables should be stationary; otherwise we run the risk of spurious regression. The IPS (Im, Pesaran and Shin) unit root test sets the null hypothesis that all the series included are non-stationary and the alternative

hypothesis that at least some of the series in the panel are stationary. For panel data, the IPS statistic gives the average of augmented Dicky-Fuller test statistics and follows a normal distribution (Im, Pesaran and Shin, 2003). If it turns out that the variables are nonstationary in their levels but stationary in their first differences, it is possible that they are cointegrated. If they are indeed cointegrated, as determined by stationarity of the error term estimated from the cointegrating regression, an error correction model (ECM) needs to be developed. On the other hand, if the series of variables are found to be not co-integrated or they are integrated of different orders, an autoregressive distributed lag (ARDL) model can be implemented. Since the panel data has a reasonably long time series for each country, autocorrelation tests will also be performed while robust standard errors should take care of any heteroskedasticity issue.

The panel data used here can display either fixed or random effects. Fixed effects technique is appropriate if the unobserved country-specific characteristics are correlated with the included explanatory variables which must then be controlled for. The fixed effects method yields consistent estimates of parameters whereas the random effects estimates are more efficient though not necessarily consistent. The Hausman test has the null hypothesis that the random effects are also consistent. If the estimated parameters are not statistically different between the two estimation procedures, the null hypothesis cannot be rejected. This makes the random effect model the preferred model. On the other hand, if the p value of the test statistic is less than 0.05, we reject the null and accept the fixed effect model as our preferred model.

Finally, the fiscal policy variables also need to be tested for possible endogeneity. Standard procedures will also be followed to ensure that the instrument chosen is exogenous as well as relevant to the model.

Chapter V

Empirical Results and Analysis

The last chapter on methodology specified the empirical models and described the data used to estimate them. Whether real GDP is best estimated at its level or its growth form depends on whether it is stationary. This chapter therefore starts with stationarity tests on GDP and other variables and explores cointegration in our panel data on South Asia. The results of these exercises indicate whether an error correction model or an autoregressive distributed lag model is appropriate to understand the relationship of GDP and its growth with the explanatory variables. That is the task for this chapter.

5.1 Test of Unit root and Cointegration analysis:

The test for stationarity of the model variables is performed in this study using the Im-Pesaran-Shin unit root test. It is important to test the stationarity because using non-stationary data in a regression might cause spurious results. Usually, when the variables are found non-stationary, these series can be made stationary by taking first difference. After making the variables stationary, pooled OLS estimation, fixed and random effect regression can be run without producing spurious results. However, this result can cause losing long run information in the variables (Soli, Harvey, and Hagan, 2008). According to Girijashankar and Chowdhury (2002), this drawback of losing long-run information caused by taking first difference of the series can be eliminated by implementing co-integration techniques. Henry (2005) explains that if the basic economic theory is accurate, then the variables in the level parts must be co-integrated and then the linear combination of I(1) levels of the variables must be I(0).

According to Soli, Harvey and Hagan (2008). Co-integration denotes the tendency of variables to drift together over time which indicates there exists a long run relationship. In other words, a relationship is considered co-integrated if an independent variable is stationary on I(1), the dependent variables are stationary on I(1), and the residuals of dependent variables on independent variables are stationary on I(0) (Engle and Granger, 1987).

Table 7: Results of Unit Root Tests for the Dependent and Independent Variables:

Variable	IPS(level)	IPS(First Difference)	Order of Integration
LnRGDP	8.1416	-3.0247	I(1)
LnGOVEXP	4.5341	-4.9278	I(1)
LnINV	3.768	-5.4978	I(1)
LnCONSUMP	5.9041	-7.1838	I(1)
LnPOP	1.2437		I(0)
TRADE	-1.9627	-5.0246	I(1)
LnTAXREV	0.1703	-3.4369	I(1)
LnAid	-0.6626	-9.6450	I(1)

Table 7 shows that all of the variables at their levels are non-stationary except for LNPOP. All of the nonstationary variables became stationary after taking first differences.

5.2 Error Correction Model with Government Expenditure

The unit root test results indicate the possibility of cointegration among variables. Granger representation theorem states that if two variables Y and X are cointegrated, then the relationship between them can be represented in terms of an Error Correction Model (ECM) (Engle and Granger, 1987).

The cointegrating regression is based on the original levels of variables. The panel model with government consumption as an explanatory variable (equation 6) yields residuals that are found to be stationary at the 10 percent significance level (p-value=0.09). Accepting the

stationarity result then leads to the implementation of an ECM model on stationary variables. This model includes the error correction term as well as all the variables in their first differences. On the contrary, if tax revenue is used as our fiscal policy variable, the residuals of the relevant cointegrating regression turn out to be non-stationary at the 5 or 10 percent level (p-value = 0.41). This precludes the use of an ECM model. In this case an autoregressive distributed lag model becomes more appropriate.

This study implements an ECM model for real GDP as a function of government consumption, among other variables, in three ways—with OLS by pooling time series and cross-section data, with fixed effects, and with random effects. Table 8 reports the results, as explained further down.

The last chapter raised the possibility that government consumption might be endogenous. If so, its estimated coefficient would be biased. To address the problem, foreign aid was chosen to serve as an instrument since government expenditures in South Asian countries have been historically funded significantly by foreign aid. Aid was indeed found to be relevant (highly correlated with GOVEXP) as well as exogenous (not correlated with the error term). The null hypothesis of exogeneity of the original variable, government consumption, was, however, not rejected by the data. The inclusion of residuals from the first stage regression into the GDP growth regression yielded a t-statistics for the residual term that was highly insignificant (p-value=0.45). While instrumental variables approach became unnecessary, the exogeneity of foreign aid in turn made it a good candidate for direct inclusion in the growth model. Foreign aid therefore appears as an explanatory variable in the ECM representation of the model for GDP growth.

Before proceeding to explain the ECM results, it should be noted that there is no issue with respect to heteroscedasticity in either Model 1 or Model 2 as the hypothesis of homoscedasticity cannot be rejected at the 5 percent level. Also, there is no serial correlation in the error term for either model when checked before estimating the error correction model.

An examination of correlation between government expenditure and tax revenue reveals that the separation of these two fiscal policies is justified for further econometric study. The correlation between the two variables is not highly significant (Appendix 2). Thus, it is important to check their impact on growth by studying the two models separately.

Table 8: Results of GDP-Government Expenditure function:

dlnrgdp	Pooled	FE	RE	Standard errors in parentheses
				*** p<0.01, ** p<0.05, * p<0.1
dlngovexp	5.89E-05	0.0022	5.89E-05	
	(0.0178)	(0.0355)	(0.0178)	
dlninv	0.160***	0.159***	0.160***	
	(0.0225)	(0.0235)	(0.0225)	
lnpop	0.00101**	-0.0149	0.00101**	
	(0.00041)	(0.0101)	(.00041)	
dtrade	-1.62E-05	7.71E-07	-1.62E-05	
	(0.00017)	(0.00016)	(.00017)	
polstab	0.00011	-0.00028	0.00011	

	(0.00139)	(0.00145)	(.00139)
dlnaid	-0.00371	-0.00296	-0.00371
	(0.0041)	(0.00406)	(0.0041)
ehatl	-0.0376***		
	(0.0133)		
time	.000176***	.000413**	0.000176***
	(5.90E-05)	(0.00018)	(5.90E-05)
ehat2		-0.0169	
		(0.0156)	
ehat3			-0.0376***
			(0.0133)
Constant	-0.00401	0.288	-0.00401
	(0.00773)	(0.185)	(.00773)
Observations	144	144	144
R-squared		0.379	
Number of countries	4	4	4

A close look at Table 8 suggests that the coefficients of almost all the variables are similar across estimation procedures. However, the Hausman test of model performance indicates the superiority of the random-effects (RE) model. The null hypothesis of RE's better performance cannot be rejected even at 10 percent level (p-value = 0.35). Thus the RE model in

this study has been found to yield consistent parameters in addition to the more efficient estimates that this model naturally produces. The explanation of results in the following paragraphs is therefore based on the RE model.

Table 8 shows that one main variable of interest, the change in government consumption, is positively correlated with real GDP growth but its effects are statistically insignificant. This result aligns closely with the growth literature. A more important driver of growth, as hypothesized before, is growth of investment. The coefficient on DLnINV (0.160) indicates, for example, that if the change in real investment could be increased by 5 percentage points, the GDP growth would increase by 0.8 percentage point. This is a highly significant result both economically and statistically and the result is identical across the three models. The investment variable includes private as well as public investment. To the extent South Asian economies still lag behind most middle income countries in social and economic infrastructure, increases in public investment in roads and schools are likely to have a large growth impact. The effects are direct in terms of lowering the cost of transportation for households and businesses as well as indirect in terms of the effects of greater education or improvement in investment climate.

The results in Table 8 reflect the effects on growth after controlling for the time trend. The growth trend has a positive slope with a high statistical significance. The trend shows growth pickup over time, particularly from the late 1990s as compared to most of the 1980s and 1990s. The population coefficient is statistically significant in the OLS and RE models though its size is marginal at best. The two external factors, foreign trade and foreign aid, show negative relationships with growth but the relationships are insignificant. The same is true of political instability dummy.

Table 8 shows another important result. The coefficient of the error correction term in the RE model is −0.038 and is highly significant. This means that the adjustment of growth toward its long-run equilibrium occurs at a rate of about 3.8 percent per year. This is fairly rapid. If the current growth is *lower* than in its equilibrium, growth in the next period will *rise* allowing the movement toward, rather than away from, the equilibrium. The long run results indicated by the cointegrating regression that yielded the error correction term are presented in the appendix.

5.3 ARDL Model with Tax Revenue

Unlike the result about government consumption, the hypothesis that real GDP and tax revenue are cointegrated was not supported by the sample data. The estimated error term from the cointegrating regression that substituted tax revenue for government consumption failed to be stationary. In other words, the nonstationarity hypothesis for the error term could not be rejected. An error correction model becomes inappropriate in such a case. On the other hand, an autoregressive distributed lag (ARDL) model can handle variables that are cointegrated of different orders. Once again, all three models—pooled OLS, fixed effects, and random Effects—can be used under the ARDL framework.

The results of these regressions are reported in Table 9. All the variables including DLnRGDP, DLnTAXREV, DLnINV, DTRADE, DLnPOP, DLnAID, and POLSTAB appear with one lag. The Bayesian information criterion for prediction error shows minimization at one lag of variables. There is no error correction term under ARDL.

Table 9: Results of GDP-Tax Revenue Function:

	Pooled	Fixed	Random				
DLRGDP	Pooled	FE	RE	Standard errors in parentheses			
				*** p<0.01, ** p<0.05, * p<0.1			
DLTXREV	0.000564	0.00111**	0.000564				
	(.00036)	(.00047)	(.00036)				
DLINV	0.194***	0.180***	0.194***				
	(.0267)	(.0277)	(.0267)				
LPOP	0.00121*	-0.0407***	0.00121*				
	(.00064)	(0.0128)	(.00064)				
DLTRADE	6.56E-06	0.000126	6.56E-06				
	(.0002)	(.0002)	(.0002)				
LPOPSTAB	-0.00151	-0.00022	-0.00151				
	(.00179)	(.00188)	(.00179)				
DLAID	-0.00242	-0.00217	-0.00242				
	(.00479)	(.00461)	(.00479)				
time	9.51E-05	.000908***	9.51E-05				
	(8.35E-05)	(0.00026)	(8.35E-05)				
Constant	-0.0123	0.754***	-0.0123				

	(.0159)	(.235)	(.0159)
Observations	97	97	97
R-squared		0.467	
Number of country	4	4	4

Results in Table 9 look quite similar to those in Table 8. As in the case of GDP growth with government consumption, the random-effects (RE) model provides the best estimates according to the Hausman test applied to the growth model with tax revenue changes. The tax variable has a positive coefficient, but it is statistically not different from zero. Second, the change in investment once again is highly significant but its effect on growth is 20 percent greater than in Table 8. Table 9 thus shows that an increase in real investment of 5 percentage points more leads to the GDP growth to increase by about 1 percentage point as compared with 0.8 point in the case of growth model with government expenditure. This significant result carries through all the models shown in Table 9. Population's effect on growth is also slightly bigger although its economic significance remains small as before.

Finally, trade openness and political instability do not display any significant relationship with real GDP growth. The sign for political instability is negative as expected but it does not have any significant impact on economic growth. Again, the results are not very different between expenditure and tax revenue models.

In summary, the major findings of this study indicate that neither government consumption nor tax revenue has a significant impact on economic growth of countries in South Asia. Investment plays the biggest positive role in real GDP growth.

CHAPTER VI

Conclusion

This thesis set out to study the impact of fiscal policy on economic growth in four South Asian developing countries—Bangladesh, India, Pakistan, and Sri Lanka. Econometric models were developed with the aid of (a) literature on the relationship between fiscal policy and growth, (b) trends in government expenditure, tax revenue and output growth in South Asia, and (3) an understanding of the properties of data from the sample countries. Empirical results show that the government consumption expenditure does not have an impact on the economic growth and neither does the tax revenue. On the other hand, public and private investments together have large and highly significant growth effects.

Government expenditure and growth were found to be cointegrated which led to estimation of an error correction model. The error or the difference from the long-run equilibrium growth is found to self-correct at a reasonably rapid rate with the error correction term coming out highly significant along with the correct negative sign. There is a gentle positive time trend in GDP growth in South Asia. Hence estimation proceeded with application of a control for the time trend. Results clearly indicate that increases in investment have a high growth return in South Asia.

For future research it would be strongly advisable to distinguish between public and private investments which may have different effects on growth. South Asian countries severely lack physical and social capital necessary to sustain a higher growth rate that the countries have been trying to achieve. It would also be interesting to attempt relative evaluation of different types of public investments. Examples would be investment on education and health for a faster

accumulation of human capital versus investment in roads and bridges for faster accumulation of physical capital.

The countries in South Asia have also increased their participation in international trade significantly over the last 20 years. Yet, trade openness failed to show a large impact on growth. It may be desirable to check the endogeneity of trade. A faster GDP growth tends to create surplus production that is then exported. If so, finding an instrument for trade would be necessary to apply instrumental variable regression technique. Finally, a deeper examination of data could uncover a structural break in output growth as well. Such a break may have occurred in the 1990s when a wave of trade liberalization and deregulation affected South Asia.

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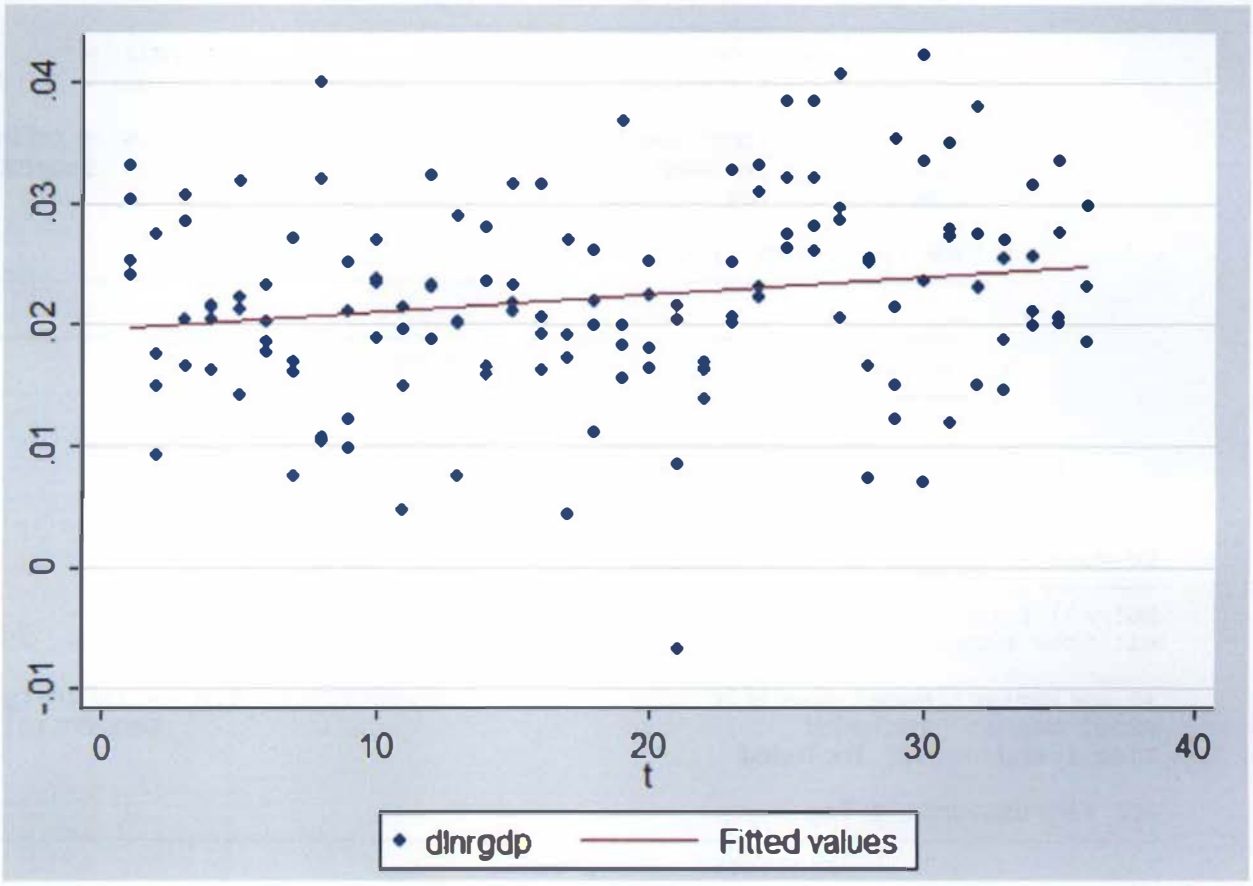
Appendix

1. Time trend graph



2. Government Expenditure and Tax Revenue Correlation test:

dlntotexp	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
dtxrev	-.000776	.0047544	-0.16	0.871	-.0102188	.0086667
_cons	.0267371	.0034677	7.71	0.000	.0198501	.0336242

3. **Residual Stationarity**

i. **GDP-Government expenditure function**

Im-Pesaran-Shin unit-root test for rhat

Ho: All panels contain unit roots
Ha: Some panels are stationary

Number of panels = 4
Number of periods = 37

AR parameter: Panel-specific
Panel means: Included
Time trend: Not included

Asymptotics: T,N -> Infinity sequentially

ADF regressions: 1 lag

	Statistic	p-value
W-t-bar	-1.3087	0.0953

ii. **GDP-Tax revenue function**

Im-Pesaran-Shin unit-root test for rhat

Ho: All panels contain unit roots
Ha: Some panels are stationary

Number of panels = 4
Avg. number of periods = 25.00

AR parameter: Panel-specific
Panel means: Included
Time trend: Not included

Asymptotics: T,N -> Infinity sequentially

ADF regressions: 1 lag

	Statistic	p-value
W-t-bar	-0.2250	0.4110

4. Hausman test

i. GDP-Government expenditure function

	Coefficients (b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
dlngovexp	.0022015	.0000589	.0021426	.
dlninv	.159173	.1602405	-.0010675	.0067568
lnpop	-.0148568	.0010126	-.0158694	.0100551
dtrade	7.71e-07	-.0000162	.0000017	.
polstab	-.0002799	.0001098	-.0003898	.00043
dlnaid	-.0029629	-.0037088	.0007459	.
t	.0004125	.0001765	.000236	.0001661

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(7) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 7.43
Prob>chi2 = 0.3852
(V_b-V_B is not positive definite)

ii. GDP-Tax revenue function

	Coefficients (b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
dtxrev	-.0004024	.0000133	-.0004157	.0001465
dlninv	.183894	.1948436	-.0109496	.0096643
lnpop	-.0290027	.0007661	-.0297687	.0128903
dtrade	.0000864	-.0000336	.0001201	.0000394
polstab	.0004145	-.0006852	.0010998	.0007387
dlnaid	-.0041414	-.0043611	.0002197	.
t	.0006105	.0000528	.0005577	.0002405

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(7) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 5.72
Prob>chi2 = 0.5728
(V_b-V_B is not positive definite)

5. Endogeneity vs Exogeneity test:

i. GDP-Government expenditure function

```
Tests of endogeneity
Ho: variables are exogenous

Durbin (score) chi2(1)          =   .57497  (p = 0.4483)
Wu-Hausman F(1,88)              =  .519347  (p = 0.4730)
```

ii. GDP-Tax revenue function

```
Tests of endogeneity
Ho: variables are exogenous

Durbin (score) chi2(1)          =    .7506  (p = 0.3863)
Wu-Hausman F(1,84)              =  .676148  (p = 0.4132)
```