



SCHOOL OF
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MANAGEMENT

**PUBLIC DEBT AND
ECONOMIC GROWTH:
AN EMPIRICAL
EVIDENCE FROM
PAKISTAN**

MASTER ESSAY- PART 1

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Abstract

This paper examines the relationship between public debt and economic growth of Pakistan. For this purpose, the study employs annual time series data of Pakistan from 1976 to 2018. Auto Regressive Distributed Lag (ARDL) approach is utilized to investigate the short as well as long run relationships between the variables. Results of the Error Correction Model (ECM) confirm that external debt, debt servicing and inflation is negatively related with economic growth whereas domestic debt, investment and openness depicts a positive relationship with economic growth both in long and the short run. It is recommended that external debt should be discouraged, and government should emphasize on financing through the domestic debt sources.

Table of Contents

1. Introduction	1
2. Literature Review	5
3. Data Description	10
4. Analytical Framework	13
5. Estimation & Results	15
6. Conclusion	23
7. References	26
8. Appendix	30

1. Introduction

Globally, both developing and developed economies procure public debt as a financing tool in addition to the revenue collected through taxes. The primary motive behind the acquisition of public debt is to compensate for the deficient revenue collection and meet the government expenditures. Political and socio-economic implications are a disincentive for certain countries to impose excessive taxation which is why public debt is an unavoidable recourse that countries have indulge in to finance either their current expenditures or development projects. Economies can choose to either acquire debt domestically or through external sources (Bal and Rath, 2014). External debt constitutes that part of the total public debt that the country has borrowed from sources outside of the country domain including international funding organizations as well as other countries. Similarly, domestic debt is borrowed from indigenous sources including commercial banks and other financial institutes.

Excessive indebtedness is a direct consequence of expansionary policies that countries have adopted while not being able to finance increasing expenditures through revenue generation or foreign investment. Debt is often acquired by economies as an additional stimulant to the economy that is above and beyond the tax collections. Generally, in policy circles, revenue generation through taxes is considered to be the first priority for financing expenditures however maintaining a debt balanced budget and acquiring debt to finance additional expenditures has been under much scrutiny and debate. Cerniglia, Dia and Hallett (2019) argue that the debt or tax financing preference of governments depends on a variety of factors. Mainly, the economies for which the prospect of borrowing is expensive, would prefer to manage tax incentives or implement changes in the taxing mechanism. On the other hand, if the option of tax smoothing is more expensive, governments prefer to acquire more debt to finance their expenditures. The paper contends that contrary to popular belief, governments do consider future fiscal imbalances and focus on maintaining reasonable fiscal balances. Governments have started to prefer debt financing over taxation after 1994 to avoid changes in taxation and become more debt accommodating in a crisis period. The paper also concludes that low debt countries have been more permissive to fund their expenditures through debt in comparison to economies with a high level of indebtedness which engage the taxpayers to fund their expenditures. Another dimension that has an influence on the government preference towards debt versus tax financing is the political implications involved.

Yared (2008) argues that the coincidence of incentive between the self-interested politician and the citizen materializes in the form of endogenous debt limits on the government which creates more distortions and macroeconomic volatility than under a more altruistic ruler. Politicians also refrain from the implication of excessive taxation to protect their vested political interests which leads to the government inclining more towards debt financing to fund their expansionary policies. Temple (1994) investigates the preferences of state and local governments around the world pertaining to financing their expenditures through domestic debt and taxes. The paper also arrives at a similar conclusion that debt financing through the issuance of local bonds is a preferred financing strategy.

The dynamics of developing economies are much different from the more advanced ones. Owing to the acute lack of resources in comparison, low fiscal space, pre-dominantly large populations, and a continuous focus on driving growth, fiscal management in developing economies has its own set of unique challenges. Pakistan's case is no different. With a population of more than 207 million, Pakistan is the fifth most populous country and is growing at a rate of 2% annually (6th Population Census Pakistan, 2017). As per the World Bank statistics, Pakistan's GDP was USD 314.6 billion as of 2018. The growth rate has experienced a drastic fall from the 5.8% in 2018 to 1% in 2019. Pakistan's GDP per capita stands at USD 1482.4 in 2018 making it a lower middle-income country. Pakistan has a very limited tax net which is comprised primarily of the salaried class and indirect taxation. This has meant that the revenue generation through tax collection has not been substantial enough to finance public expenditures which is why the country has had to resort to excessive borrowing from both internal and external sources. As of December 2018, Pakistan's gross public debt stood at around USD 156 billion of which USD 102.6 billion was domestic debt, USD 53.3 billion was external debt. In totality, Pakistan's Debt-to-GDP ratio stands at around 49.5% (Pakistan Economic Survey, 2019). Sources of the domestic debt include the State Bank of Pakistan, commercial banks, and the issuance of government bonds. Conversely, Pakistan acquires external debt from friendly countries as well as international donors such as the World Bank, Asian Development Bank and IMF. Both domestic and external sources have been key financing channels in times of economic duress.

Since Pakistan's inception, the country has been facing an acute financial crunch whereby the country is not able to cope with the rising expenditures creating a persistent fiscal deficit which

then has to be financed through the recurring uptake of loans. This means that a considerable amount of the GDP has to be spent on debt servicing which further constricts the fiscal space available to the government and has complicated development planning to a great degree. Over the years, unproductive use of debt and inability of successive governments to expand the tax net has meant that the debt problem has only aggravated. As the real cost of borrowing has increased over the years, increasing interest repayments have meant a contraction of development expenditures and government choose not to constrict the current expenditures. Pakistan has had to acquire further debt to be able to service the previous accumulated stock of debts. Pakistan first went to the IMF for a bailout package in 1958 of USD 25,000. Since then, Pakistan has availed 22 IMF programs in times of fiscal crush which have been a particular burden on the economy as IMF financing programs are usually coupled with the mandatory application of constrictive policies which have also not bode well for the country's poor. Latest in the string of IMF bailout packages was acquired in 2018 and to the tune of USD 6.6 billion as the newly elected government failed to fund the expansive expenditure. Excessive debt acquisition after 2008 depicts that Pakistan has not been able to utilize the debt to stimulate economic growth and has failed to put in place effective debt management strategies (Akram, 2011).

The profound impact that borrowed finance has on the economy is an element of key interest to both policymakers and theorists alike. No definitive consensus has been developed on the relationship between debt and the economy or how debt has an impact on the economy. Neo-classical theorists contend a consistently negative impact of debt on growth. Both the Blanchard model and Solow model predict a negative relationship between debt and growth however they do also concede that the burden of public debt is country specific and is influenced by the growth rate of population and the marginal propensity of the population to save (Dombi and Dedak, 2018). Conversely, Keynesian theorists argue that through an extension of the Keynes general theory the effect of debt on the economic growth is non-linear and that under the ideal set of conditions, up to a particular level of indebtedness, it can stimulate economic growth (Butkus and Seputiene, 2018).

Both domestic and external sources of debt have varying impacts on the economic growth. In theory, external debt, up to a reasonable level, can be expected to induce growth of the economy through the accumulation of capital as well as productivity growth (Chowdhury, 2001). If countries

can make productive investments through the external borrowings, it can create macroeconomic stability and increase the speed of development (Burnside and Dollar, 2000). Consensus among contemporary theorists is that beyond a certain level of debt, can also negatively affect economic growth which is explained by the “debt overhang” effect. This occurs when an economy becomes overburdened with debt and cannot acquire further debt. A significant proportion of the expenditures are spent on the servicing of existing debt which can severely constrict the country’s domestic and foreign investment. Debt overhang effect can negatively impact economic growth (Sen, Kasibhatla and Stewart, 2007). Debt can also negatively impact economy through the “crowding out” effect. This is when much of the foreign capital is being unitized on the servicing of existing external debt and not much is residual for investment and growth (Karagol, 2002).

Domestic debt in developing countries can also have a positive economic impact as it not only supports the development of domestic financial markets but also protects the countries from external shocks which external debts may expose it to. It can also help crowd in risky private sector investments (Akram, 2011). However, domestic debt can also make the economy prone to the “crowding out” effect. When borrowing domestically, the government is actually borrowing from the pool of domestically available private savings which could have been more productively and efficiently utilized as private sector lending. This leads to reduced investment from the private sector and eventually attenuated growth (Diamond, 1965).

The purpose of current study is to explore the impact that acquiring public debt may have on the economy. The study attempts to discern this relationship while bifurcating external and domestic debt in the model to gauge their varying impacts on growth. An Auto Regressive Distributive Lag methodology is considered for empirical analysis while considering some important control variables which also have an impact on economic growth such as inflation, investment, openness of economy and servicing of debt among others. The paper will enrich the available literature available on developing countries, particularly Pakistan, pertaining to the study of public debt and economic growth

The study is structured as follows, 1) An introduction of the theoretical overview of the impact of debt on the economic, 2) A comprehensive literature review covering all aspects under review, 3) A brief description of the data used and its sources, 4) constructing the analytical framework

for empirical analysis, 5) a description of the estimations and a profound analysis of the results and 6) the conclusion of the study.

2. Literature Review

The impact of public debt on economic growth has been of key interest to economists and even more so in the post-recession global economy where governments have allowed their debt-to-GDP to inflate to unprecedented levels to finance public expenditures. Abundant literature is hence available on the varying impact of public debt on economy. No clear consensus exists on whether public debt, be it external or internal, has a positive or negative impact on economic growth. Classical theorists vehemently refuted the notion that public debt can have a positive impact on economic growth and instead advocated for a negative relationship between them (Bal and Rath, 2014). Ricardo (1951) in what was later developed into the Ricardian Equivalence theory, contemplated that the impact of financing the public expenditure either through public debt or taxation, on the economy would be the same. Ricardo implied a neutral impact of debt on the economy. On the other hand, Keynesian economists argue that borrowed public financing will raise economic growth. Conversely, monetarists are of the view that the macro economic effects of public debt leads to an increase in the interest rate which in turn crowds out private investment. This leads to borrowed financing having an adverse effect on economic growth. The debt overhang theory has also garnered traction which says that when through excessive debt acquisition, the country loses its ability to repay future debts, debt servicing costs will reduce domestic and foreign investment in the country which will in obviously have a negative impact on the economy (Bal and Rath, 2014).

Since the 1950's, economies started adopting Keynesian notions that allowed deficits in recessions to be balanced by surpluses in booms. This implied that countries could acquire debts in recessionary periods and repay those debts through the surpluses generated in booms. Political overlays however are reluctant to generate the required surpluses to balance former deficits and repay the debts accumulated which would necessitate a spending cut which is a politically unpopular policy. Consequently, a rise in public debt-to-GDP ratios has been observed in recent years (Kirchgässner, 2014). Chen, Yao, Hu and Lin (2017) use data from 65 developing and developed economies, focusing mainly on China to investigate the impact of debt on the economy.

Their findings suggest that for China with a debt-to-GDP ratio of 41.14% in 2014, debt was still stimulating the economy and the negative impact has yet to be experienced by the economy.

Many studies have determined a negative relationship between debt and economic growth. Emmanuel (2012) estimates a functional linkage between debt and GDP using co-integration technique. Results indicate a negative relationship between debt on economic growth that is significant in the long run. However, debt may have a positive impact on the economy in the short run. The study concludes that the negative relationship in the long run can be attributed to incompetent debt management which is much more prevalent in the developing economies. Another study, however, contradicts this result and predicts that both developing and developed countries will be negatively impacted by public debt however, this impact is more pronounced in the advanced economies (Intartaglia, Antoniadis and Bhattacharyya, 2018). Mhlaba and Phiri (2019) use ARDL model on South African data from 2002 to 2016 to examine the varied short run and long-term relationship of public debt and economic growth. They also reach a similar conclusion that for all cases, public debt negatively affects growth and that the impact is stronger in the post-crisis period. Woo and Kumar (2015) find that high initial public debt-to-GDP levels have a significantly adverse effect on subsequent growth which is driven by a slowdown in growth of labour productivity.

The country risk environment including the political and financial risk, can also have a bearing on the relationship between debt and growth. Chiu and Lee (2017) find that for countries with a high-risk environment, acquiring excessive debt can adversely affect economic growth. On the other hand, for countries with a low-risk environment, raising public debt and positively impact the economy. These results imply that policymakers should adopt an optimal borrowing strategy while considering the current risk environments in their countries. These conclusions indicate that public debt has no linear effect on economic growth which is discussed at a later stage. Even in the EU, for countries such as Greece with high public debts instigate economic recessions. For other EU countries which implement budgetary policies limiting the public amounts borrowed and practice increased discipline in the use of public borrowings, a modest to low level of correlation exists between debt and growth (Andronic, 2019). Similar to conclusions derived in the EU, even in the African countries most of which are developing or underdeveloped, studies have determined public debt to negatively impact economic growth (Lartey, Musah, Okyere and Yusif, 2018).

Many studies have also concluded the relationship between public debt and economic growth to be non-linear. There seems to be no consensus on the inflection point on when the impact of public debt on economic growth inverts. 'Growth in a Time of Debt' a paper produced by Reinhart and Rogoff (2010) is considered to be an authority on the notion of the non-linear impact of public debt on economic growth. They employ an empirical approach on a multi-country historical dataset to estimate the systematic impact of high debt levels on economic growth. Overall, their results show that public debt does not have any significant impact on the growth of an economy if it remains at normal levels. As debt starts to increase to a high percentage of GDP i.e. 90% and higher, a negative relationship with growth emerges as countries that have such high debt-to-GDP ratios experience a 1% lower median growth rate. They also conclude that the impact of public debt on economic growth is not significantly different between developing and advanced economies.

A paper investigating the impact of debt on growth in EU countries observes the impact of public debt on GDP growth to be non-linear which is significant and positive till debt-to-GDP ratio of close of 90-100% after which debt adversely impacts long-term growth. The study also finds that public investment, total factor productivity and private savings are the instruments through which debt can impact the economy non-linearly (Checherita-Westphal and Rother, 2012). Shahor (2018) investigates the long-term impact of public debt on the Israeli economy. The study concludes that the impact is highly dependent on the size of debt in relation to the GDP i.e. moderate debt-to-GDP ratio, public debt has a significant and positive impact on the economy. As the ratio increases to high levels, the marginal impact on economy becomes negative. Shahor estimates the inflection point of GDP to debt ratio to be closer to 130% and greater.

In a similar research Vector Autoregressive (VAR) model is used to estimate the relationship between public debt and economic growth, government expenditures and revenues. Results show that in the short-term, the economy experiences contractionary forces however, it starts to grow after that. Conversely, public debt causes an increase in government expenditures and revenues for two periods after which they decrease. The results imply that the instruments through which public debt impacts economic growth are enhanced government expenditures which have a lagged impact on growth (Rosoiu, 2019). Pattillo, Poirson and Ricci (2002) determines that external debt has a non-linear effect on economic growth in developing countries. Results show that debt has a

positive average impact on growth up to the point when it reaches 35-40 % of GDP. Any incremental debt has a negative impact on GDP at half of these values (Pattillo, Poirson and Ricci, 2002).

Another study determines the optimal Debt-to-GDP ratio which generates the highest growth in Jordan. The results show that this optimal level of the ratio is 53% which public debt adversely affects the economy (Maghyereh and Omet, 2003). Blavy (2006) determines that debt has a positive impact on GDP at levels below 21% debt-to-GDP ratio. Beyond this level, debt has a significantly adverse impact on growth. Egert (2015) uses multiple econometric techniques to determine that the non-linear effect of debt starts at relatively moderate levels of public debt of around 20-60% of GDP after which it adversely affects growth. Minea and Parent (2012) estimate this threshold to be around 115% of GDP. Significant disparity exists regarding the debt-to-GDP ratio threshold in these studies that suggest a non-linear impact of debt to GDP hence no clear consensus can be formed. However, no such research has been found to suggest a consistent positive impact of debt on growth.

Most studies consider the impact of total economic debt on growth however, it is important to differentiate between the impacts of external and internal debt on the economic growth as both impact growth through varied channels and have different policy implications. Stavvytskyy and Bilychenko (2018) estimate the relationship of external debt and the economy of both developed as well as low-income countries. Results of the study suggest that that strongest positive impact on economic growth is produced by debt levels of 65 to 70% of GDP.

Results show that a level of debt to GDP ratio of 65 to 70% produces the strongest positive impact on economic growth. However, above 88% debt-to-GDP ratio, this affect is inverted (Stavytskyy and Bilychenko, 2018). Similar results have been produced by a comparative study between Nigeria and South Africa. This study employs the Neoclassical growth model which incorporates the indicators of debt, the external sector as well as other macroeconomic indicators. Results show that up to a point, external debt has encouraged the economy in both countries. Beyond that point, both debt and its servicing effect the economy negatively (Ayadi, 2008).

Shah and Pervin (2010) investigate the long-term impact of external accrued liabilities on Bangladesh's economy. They use data from the period 1974 to 2010 to conclude that in the short run, the actual debt stock does effect growth significantly, however, external public debt service

does have a negative impact on growth. In the long run, the external debt stock stimulates economic growth and the debt service has a negative effect. The study concludes that for developing economies like Bangladesh, the strategy should be to reconcile the debt for economic growth. These results have been replicated by Kasidi and Said (2013) in Tanzania who estimate the relationship between external debt and the economy from 1990 to 2010. They conclude that external debt does encourage the economy in the short run however, this positive effect is only mild and debt servicing— that seeks to engage current and new lenders by restoring credibility to encourage development, negatively affects economic growth. Contrary to the study in Bangladesh, this study finds no long run relationship between external debt and GDP. Another study testing a similar hypothesis, correlates low external debt levels to enhanced growth rates for developing economies through capital accumulation growth. Conversely, public debt has no significant impact on growth in industrial countries (Schclarek, 2005).

Similarly, several studies have explored the relationship of internal debt and the economy. Singh (1999) studies the impact of domestic debt on growth in India over three decades from 1959 to 1995. Results agree with the Ricardian equivalence hypothesis that internal debt does not significantly impact the economy. Another paper studies that varying impact of internal and external debt on the Nigerian economy using the Augmented Dickey-Fuller technique. Results show that where external debt can be inhibitive to the growth of a country, domestic debt, if managed properly, can instigate high growth levels. The paper goes on to recommend that the government should give preference to acquiring debt from internal sources to instigate growth and not external debt (Umaru, Hamidu and Musa, 2013). A similar result and recommendation were also produced in another Nigerian study (Amassoma, 2011).

Comparative impacts of domestic and external debt on the economy have also been evaluated by some studies in Pakistan. Atique and Malik (2012) estimates the impact separately using data from 1980 to 2010 using multiple econometric techniques and tests. Results suggest that both types of debt have an adverse impact in the economy, however, the negative impact of external debt is significantly stronger. Siddique, Ullah and Haq (2017) test the relationship between external debt and economic growth in Pakistan and make similar conclusions that debt acquired externally has a negative economic impact. Another paper investigates the relationship between internal debt and growth of Pakistan's economy. Results depict that the domestic borrowings by the government has

primarily been utilized towards expenditures that contribute to economic growth which drives the positive impact of domestic debt on the economy. However, another observation from the results is that domestic debt servicing adversely affects growth and this negative impact subdues the positive impact of debt stock (Sheikh, Faridi and Tariq, 2010).

Much of the reviewed literature indicates towards an adverse impact of public debt on economic growth when considered in its totality. However, studies do also suggest that the adverse effect is not as profound in the advanced economies that have better debt management capabilities and are able to incur more growth inducing expenditures. When external and internal debt are considered separately, most of the reviewed literature indicates towards external debt and its servicing to have a significant and negative impact on the economy. Conversely, studies suggest that domestic debt, if managed properly, can prove to be positive stimulus for the economy.

Even the studies that indicate towards a non-linear relationship, suggest a certain inflection point of the Debt-to-GDP ratio beyond which the relationship becomes negative. Even for the higher estimates of this inflection point i.e. between the range of 70 to 100 percent, many of the contemporary, post-recession economies are operating at similar or higher levels of debt. Not much research is available on the impact that public debt has had on the economy of Pakistan, which is considered to be an emerging economy of the world, apart from a few empirical studies. Most of the studies that include Pakistan in their analysis do so as one of many developing countries and treat them all as having similar traits. However, each economy, especially one as complicated as that of Pakistan, has its own dynamics and nuances and needs to be avidly scrutinized to determine overall impact of debt and understand the channels of that impact. The current study serves to fill in this gap. While most of the other studies employ panel data and evaluate the impact on a more cursory level, the present study intends to dig deep into understanding the impact by employing an optimal set of data and empirical techniques. The impact of both categories of debt on the economy will be determined through an ARDL approach while considering the multi-variate characteristics of the economy.

3. Data Description

To estimate the relationship between public debt and economic growth, yearly time series data of Pakistan from 1976 to 2018 was employed. The data was accumulated from various credible sources and was modified as per the requirements of the study. Although the sample size is not as

large, however it is sufficient to conduct a time series analysis and to derive some key insights on the relationship under consideration. The variables employed in the data set include GDP per capita (y), domestic debt (dd_y), external debt (ed_y), debt servicing (ds_x), investment (k), openness (op) and inflation (inf). Log-transformation of all variables was used to compensate for the difference in magnitude of various variables used in the analysis. Table 1 below summarizes key statistics of the variables such as mean, standard deviation, minimum and maximum value.

Table 1
Summary Statistics of Variables

Variables	Mean	S. D	Min	Max
Y	636.6	383.5	193.8	1,482
ed_y	8.678	4.988	1.935	16.96
dd_y	11.36	8.985	1.290	32.62
ds_x	25.20	8.600	9.222	40.56
K	16.22	1.639	12.52	19.24
Op	33.09	3.394	25.31	38.91
Inf	8.070	3.705	2.529	20.29

GDP per capita (y) of Pakistan is included as a measure for economic growth. It is represented in current US dollars and is calculated by dividing the GDP with midyear population of the country. The time series of GDP per capita portrays an upward trend with a minimum of USD 193.7 in 1976 and USD 1482.4 as maximum value in 2018 (Figure 1.A). Non-stationarity is also evident from the graph as it is not mean reverting and the variance does not appear to be constant. Conversely, the graph of the first difference of this series seems to be stationary (Figure 2.A). This will have important implications on the analysis conducted in this study.

The focal variable for current study is the public debt which is bifurcated into external and domestic debt to investigate the varied impacts of both on growth. External debt (ed_y) is percentage of external debt to GDP. Pakistan has an average external debt of 8.6% of the GDP. Overall, time series plot shows a steeply positive trend as the country's external debt is increasing with every year (Figure 3.A). However, a significant reduction in external borrowing can be observed in early 1980s and in late 2000s. Over the course of Pakistan's history, external debt was lowest at 1.93% of the GDP in 1981 and is highest at 16.9% of the GDP in 2018. The differenced

series is relatively stationary and is shown in figure 4.A. Similarly, domestic debt (dd_y) is the percentage of domestic debt to GDP. Average domestic debt has been 11.3% of the GDP and portrays a similar trajectory as that of the external debt (Figure 5.A). Domestic debt was at its lowest at 1.29% in 1981 and is the highest at 32.61% of the GDP in 2018. As in the case of external debt, figure 6.A shows that the first differenced series of domestic debt that looks relatively stationary as compared to the original series.

To obtain an unbiased estimate of the impact of public debt on economic growth, other indicators that might affect growth have been incorporated in the regression. These control variables prevent omitted variable bias that may occur if these variables were excluded. Debt servicing (ds_x) is one of these variables that effect the economy as high levels of debt can extract significant revenue from the economy in the form of debt servicing. This study employs debt service as a percentage of exports to determine its effect on the economic growth. No evident pattern emerges in the graph of ds_x as it appears to be cyclical during the period under consideration (Figure 7.A). However, a major drop can be observed in late 2000s. In 2011, debt servicing was lowest at 9.22% of the exports whereas it reached a maximum of 40.56% of the exports in 1997. Figure 8.A shows that the first difference of the series is mean reverting with constant variance over time.

Investment (k) is another variable that affects economic growth. Theoretically, investment stimulates the economy. Thus, gross fixed capital formation as a percentage of GDP is used as an indicator of investment in the economy. With a mean of 16.22% of the GDP, investment in Pakistan has remained almost stagnant over the time span under consideration. However, the graph in figure 9.A show two steep declines in the investment in late 1990s and in late 2000s. Lowest point was in 2011, when investment stood at 12.52% of the GDP as compared to the highest point when it was 19.23% in 1993. Furthermore, first difference of the series is perfectly stationary with a mean of zero (Figure 10.A).

Another key variable that several studies have identified as having an impact on the economy is openness (op) of the economy. With enhanced trade, the country earns important foreign exchange which in turn benefits the economy. Moreover, imported goods enhance competition in the local market making better quality products available to the consumers at a competitive price. Considering this, trade as a percentage of GDP determines the openness of the

economy. Trade in Pakistan hovers around 33% of the GDP throughout period considered (Figure 11.A). Trade was lowest in 2016 and highest in 1990 with 25.30% and 38.90% of the GDP, respectively. Figure 12.A depicts the first difference of this series which appears to be stationary.

Inflation (*inf*) is one of the factors that plays an important role in stimulating the economy. Inflation is gauged by the consumer price index in the current study. Pakistan on average, experiences an inflation of 8% annually. As depicted in Figure 13.A, several fluctuations can be observed around the mean with a significant spike in 2008 with an inflation of 20.28%. Conversely, in 2015 inflation was lowest at 2.52%. Furthermore, perfect stationary is evident in the first difference of the series as shown in Figure 14.A. Data sources of all the variables defined above are summarized in table 2 below.

Table 2

Data Sources of the Variables

Data	Source
GDP Per Capita (y)	World Development Indicators (World Bank)
Domestic Debt (dd_y)	Pakistan Economic Survey 19-29, Ministry of Finance, Government of Pakistan
External Debt (ed_y)	Pakistan Economic Survey 19-29, Ministry of Finance, Government of Pakistan
Debt Service (ds_x)	World Development Indicators (World Bank)
Investment (k)	World Development Indicators (World Bank)
Openness (op)	World Development Indicators (World Bank)
Inflation (inf)	International Financial Statistics (IMF)

4. Analytical Framework

The output of an economy is a function of the two basic factors of production— capital and labour.

$$Y = f(K,L)$$

There is supportive evidence that the productivity of labour and capital is negatively affected if a nation's debt burden is more than its capacity to repay its loans (Cunningham, 1993). Debt overhang theory prevails in case of most developing countries since these countries cannot borrow more money to invest in projects that tend to enhance the productivity of labour and capital.

Consequently, the output of an economy becomes stagnant. Cunningham (1993) included debt burden of a country in the production function. This study uses a Cobb-Douglas production function with debt burden and other control variables in it. Akram (2011) develops the resulting growth equation in reduced vector form as follows:

$$Y_t = \alpha + \beta Y_{t-1} + \sum_{j=1}^k \delta X_{tj} + \sum_{m=1}^p \pi Debt_{tm} + \varepsilon_t$$

(equation A)

In the above equation y_t is the log-transformed GDP per capita at time t . Y_t is regressed by its lagged series of y_{t-1} . $Debt_{tm}$, the key regressor, is a vector of public debt variables i.e. external debt (ed_y) and domestic debt (dd_y). Whereas i_t is a vector of control variables that are to be included in our model. It consists of debt service (ds_x), investment (k), openness (op) and inflation (inf). Moreover, ε_t is the error term of the regression equation.

Stationarity of the variables is one of the necessary conditions that needs to hold before proceeding to model selection. Non-stationarity causes a spurious regression and produces inaccurate results. To determine the stationarity of variables, an Augmented Dicky Fuller (ADF) test is used. The null hypothesis of existence of a unit root is being evaluated against the alternative of stationary time series. Table 3 below contains the results of ADF test in level and in first difference.

Table 3
Results of ADF Test for Unit Root

Variables	Levels	1 st Difference
y	-0.487	-5.407*
ed_y	-0.734	-5.170*
dd_y	-1.169	-4.307*
ds_x	-2.042	-8.012*
K	-1.892	-6.126*
op	-2.309	-6.955*
inf	-2.668**	-7.136*

*,** denotes rejection of null hypothesis at 5% & 10% significance level respectively

It can be observed from the table above that not all the variables are I(0). Apart from the inflation (inf) that is I(0) at 10 percent significance level, all the other variables are I(1) at 5% significance level.

For model selection, the ARDL model was considered which is optimal in the case where there is a combination of I(0) and I(1) variables (Pesaran, Shin and Smith, 2001). This study will use ARDL model to gauge the long run and short run relationship between public debt and economic growth. Another advantage of using ADRL approach is that it is applicable on smaller sample sizes (Pesaran, Shin and Smith, 2001). Since the sample size employed for the current study is small, fitting an ARDL model would give meaningful insights on the relationships under consideration. To determine the impact of debt on growth the ARDL model's Vector Error Correction Model (VECM) equation is as follows (Akram, 2011):

$$\begin{aligned} \Delta Y_t = & \alpha + \gamma_1 \sum_{i=1}^{p_1} y_{t-i} + \gamma_2 \sum_{i=1}^{q_1} ed_y_{t-i} + \gamma_3 \sum_{i=1}^{q_2} dd_y_{t-i} + \gamma_4 \sum_{i=1}^{q_3} ds_x_{t-i} + \gamma_5 \sum_{i=1}^{q_4} k_{t-i} \\ & + \gamma_6 \sum_{i=1}^{q_5} op_{t-i} + \gamma_7 \sum_{i=1}^{q_6} inf_{t-i} + \sum_{i=1}^{p_1} \omega_i \Delta y_{t-i} + \sum_{i=1}^{q_1} T_t \Delta ed_y_{t-i} + \sum_{i=1}^{q_2} \sigma_i \Delta dd_y_{t-i} \\ & + \sum_{i=1}^{q_3} \beta_i \Delta ds_x_{t-i} + \sum_{i=1}^{q_4} \Phi_i \Delta k_{t-i} + \sum_{i=1}^{q_5} \theta_i \Delta op_{t-i} + \sum_{i=1}^{q_6} \pi_i \Delta inf_{t-i} + \delta ECM_{t-1} + \varepsilon_t \end{aligned}$$

(equation B)

α is the intercept, γ_i are the long run coefficient for each variable and ω , T , σ , β , Φ , θ and π are the short-run coefficients. δ is the coefficient of the error correction term and ε_t is the error term. The impact of public debt on economic growth will be analysed in the following section.

5. Estimation & Results

Two methods can be adopted to execute the ARDL approach. These include the VAR model and the VECM model. The decision to use one of these models is dependent on the cointegration among the variables that are being used. If cointegration exists, VECM should be used otherwise the model should be estimated using VAR. To test for cointegration Johansen Test and Bound Test may be used. This study employs the Bound test for cointegration as it is considered to be more robust than the Johansen test (Pesaran, 2001). Since the variables are both I(0) and I(1), bound test is optimal to test for cointegration. The H_0 and H_1 hypotheses are as under:

$$H_0: \gamma_1 = \gamma_2 = \gamma_3 = \gamma_4 = \gamma_5 = \gamma_6 = \gamma_7 = 0$$

$$H_1: \gamma_1 \neq \gamma_2 \neq \gamma_3 \neq \gamma_4 \neq \gamma_5 \neq \gamma_6 \neq \gamma_7 \neq 0$$

The null hypothesis states that co-integration does not exist which implies that a long-run relationship does not exist. Conversely, the alternate hypothesis states that co-integration exists, and the variables have a long-run relationship among them. Lag selection is critical before running the bound test because based on the number of lags selected the results might vary. Akaike Information Criterion (AIC) & Schwarz Bayesian Information Criterion (BIC) both suggest a lag length of four to be used (Table 1.A). Using the lag length of four, a lag length matrix was obtained that informs about the optimal number of lags to be used for each variable in the bound test (Table 2.A). Finally, bound test with the individual optimal lag length for each variable is applied. Below is table 4 containing the result of the bound test along with the critical values for integration of order zero and one.

Table 4

Results of Bound Test

F-statistic Value	Significance Level	Bound Test Critical Value	
		I(0)	I(1)
19.87	1%	3.15	4.43
	5%	2.45	3.61
	10%	2.12	3.23

F-statistic of the bound test is 19.87. For co-integration to exist, the F-statistic should be greater than critical values of I(1) regressors. As can be observed from the above table, 19.877 is greater than the I(1) critical values at the 1%, 5% and 10% significance levels. Hence, we can say that co-integration exists which is indicative of a long run relationship between the variables.

Error Correction Model (ECM) is applied when co-integration exists between the variables. Equation B in the previous section needs to be estimated with the optimal number of lags as were obtained from the AIC criteria (lag length matrix). Firstly, the long-run coefficients were derived

from the regression. Table 5 below contains information on the coefficient for the variables, their standard errors, and the value of respective t-statistic.

Table 5
Long Run Estimates (4 3 4 4 4 4)

Variable	Coefficient	Std. Error	t-statistic
dd_y	1.070***	0.0759	14.10
ed_y	-0.986***	0.0848	-11.63
ds_x	-1.062***	0.100	-10.57
k	1.356*	0.529	2.563
op	2.570**	0.640	4.016
inf	-0.976***	0.157	-6.206

*** p<0.01, ** p<0.05, * p<0.1

Results suggest that there exists a negative relationship between the external debt (ed_y) and economic growth. The coefficient of ed_y is negative with a value of -0.98 which means that a 1% increase in external debt-to-GDP ratio the GDP per capita is decreased by 0.98% and vice versa. The negative relationship is significant at 1% significance level with a standard error of 0.08. The result corroborates with previous studies including Bal & Rath (2014) and Mhlaba & Phiri (2019) who determined external debt to have an adverse effect on the economy in the long run. Empirical results indicate a positive relation between domestic debt and economic growth. The coefficient of dd_y is 1.07 and is significant at the 1% significance level with a standard error of 0.07. Literature presents two conflicting conclusions on the relationship of domestic debt and the economy i.e. one deems it a burden on the economy whereas the second– Ricardian Equivalence, theorises that debt financing does not hinder economic growth. However, the empirical evidence on the domestic debt in the economy is very limited. In case of Pakistan, the latter effect prevails as a positive relationship is observed. This implies that the amount borrowed domestically has been spent productively which in return has stimulated the economy (Sheikh, Faridi and Tariq, 2010).

Furthermore, the results depict an inverse relationship between debt servicing as a percentage of exports and economic growth. A percentage change in debt servicing to exports ratio changes the GDP per capita by 1.06%. The coefficient is significant at 1% significance level

having a standard error of 0.10. One explanation for this inverse relationship is that Pakistan is unable to collect enough revenues due to the weak tax collection infrastructure. Therefore, a significant percentage of the amount collected is used to service the debts which otherwise could have been utilized as development expenditure. Similar results were achieved by Karagol (2002) for Kenya where the situation is the same as Pakistan. In addition, the role of investment as a stimulant for the economy is also observed. The coefficient on gross capital formation as a percentage of GDP at 1.35, is fairly high and is significant at 5% significance level. However, the standard error is a bit high i.e. 0.52. Borensztein, De Gregorio and Lee (1998) showed that if the economy has enough capability to absorb the investment in capital, specifically in modern technology, then it will positively impact economic growth. The case seems to be similar for Pakistan as portrayed in the regression results.

Openness of the economy is positively related to economic growth of Pakistan. Economic intuition supports this result as solid evidence has been found that openness of the economy leads to higher economic activity in a country. This enhanced economic activity is not only linked to export-led growth but to import-led growth as well (Awokuse, 2008). The impact of openness of the economy on growth is very strong as the coefficient of “op” is 2.5 and statistically significant at 5% significance level. Conversely, inflation is negatively related to economic growth in Pakistan. The coefficient is -0.97 and is significant with a standard error of 0.15. Non-linear effects of inflation are evident in the empirical result. A study finds that there is a structural break between the relationship of inflation and economic growth. This break occurs at 8% inflation rate (Sarel, 1995). Below 8%, inflation and economic growth are positively related but above 8% there exists a negative relationship between the two. This result also holds for the current study as the inflation averages at 8% in Pakistan and is frequently above the 8% mark.

Second step in the ADRL model is to estimate the short-run relationship. When cointegration exists short-run error correction also takes place (Akram, 2011). This error correction is depicted by the Error Correction term in the ECM. The coefficient of the error correction term is 0.26 and is significant. It is also referred to as the speed of adjustment of the economy. It signifies the progress towards the long run equilibrium a year after the shock.

Table 6
Short Run Estimates (4 3 4 4 4 4 4)

Variable	Coefficient	Std. Error	t-statistic
D.dd_y(-1)	0.243**	0.0687	3.537
D.dd_y(-2)	0.326***	0.0661	4.941
D.dd_y(-3)	-0.0739	0.0671	-1.102
D.ed_y(-1)	-0.608***	0.0519	-11.72
D.ed_y(-2)	-0.116*	0.0516	-2.245
D.ed_y(-3)	0.163**	0.0507	3.216
D.ed_y(-4)	-0.302***	0.0474	-6.366
D.ds_x(-1)	-0.293***	0.0420	-6.973
D.ds_x(-2)	-0.283***	0.0385	-7.349
D.ds_x(-3)	-0.167***	0.0286	-5.822
D.ds_x(-4)	-0.119***	0.0212	-5.617
D.k(-1)	0.438**	0.121	3.609
D.k(-2)	0.592***	0.138	4.304
D.k(-3)	0.801***	0.132	6.086
D.k(-4)	0.712***	0.0968	7.360
D.op(-1)	0.275**	0.105	2.618
D.op(-2)	0.486***	0.0719	6.757
D.op(-3)	0.233**	0.0693	3.360
D.op(-4)	0.236**	0.0689	3.423
D.inf(-1)	-0.153***	0.0218	-6.999
D.inf(-2)	-0.0559***	0.0125	-4.486
D.inf(-3)	-0.0496**	0.0140	-3.540
D.inf(-4)	-0.0252	0.0132	-1.905
ECM	0.26	0.0450	5.94
Constant	0.521	0.424	1.228

*** p<0.01, ** p<0.05, * p<0.1

It depicts how much of the adjustment towards the long-run equilibrium is made after one year of a shock. Results show that 26% of the adjustment towards the long-run equilibrium is achieved one year ahead of a shock. This speed of adjustment is relatively lower than some other developing economies of the world. For instance, the speed of adjustment for India was found to be quite higher than Pakistan (Bal and Rath, 2014). Table 6 above consists of short-run coefficients of each lag as specified in the VECM, their standard errors, and the value of relevant t-statistic along with the error correction term.

Short-run coefficients are determined using the optimum lags for all variables as indicated by the AIC. External debt adversely impacts the economy even in the short run and the relationship is significant. The coefficient of the first lag is -0.6 having a standard error of 0.05. This means that a 1% change in external debt to GDP ratio causes a 0.6% change in GDP per capita. This validates the results from previous studies that the immediate impact of external debt on economic growth is negative (Sen, Kasibhatla and Stewart, 2007). On the other hand, domestic debt is positively related to economic growth in the short run as well as in the long run. Akram (2011) also determines a positive relationship between domestic debt & economic growth for Pakistan in short run. The first lag coefficient is 0.24 that is statistically significant at 5% significance level with a standard error of 0.06. Furthermore, economic growth slows by 0.29% if the debt servicing to export ratio increases by 1%. Kasidi and Said (2013) found similar results in a study conducted on Tanzania where significant and adverse relationship exists between the two variables in the short run. Although, in our case the intensity of this negative relationship decreases with each lag following a change.

Contrarily, investment in the short run is positively related to economic growth (Akram, 2011). The relationship comes out to be significant at 5% significance level. For the first lag a percentage change in gross capital accumulation to GDP ratio is followed by 0.43% increase in the per capita GDP. The coefficient of the first lag is not that high as that of the long run relationship i.e. 1.35 and has a standard error of 0.12. However, the effects become stronger with increasing number of lags. This is intuitively correct as the impact of investment on the economy is evident once sufficient time has passed.

Trade liberalization and openness is beneficial for the economy in short run too. A detailed analysis conducted by Yanikkaya (2003) on Trade openness and economic growth found a positive relationship between these two variables in short run. 0.27% of change is observed in economic activity due to a percentage change in trade to GDP ratio. The coefficients are significant and are almost of the same magnitude as the long run coefficient for openness. Apart from this, inflation shows a negative relationship with economic growth in the short run. Though the estimates are significant, their magnitude is far less than the long run coefficient. For a one percent raise in consumer price index the GDP per capita is changed by 0.15% in the first lag. Whereas this change is limited to just 0.05%, 0.04% and 0.025% with second, third and fourth lag respectively.

A few postestimation tests have been employed to determine the robustness of the model. To start with, the model is checked for heteroscedasticity. If there is heteroscedasticity in the model Newey West standard errors should be used instead of the regular ones. White test for heteroscedasticity was applied to the model. Null hypothesis states that the model is homoscedastic whereas as per the alternate hypothesis there exists heteroscedasticity. The result, as shown in table 7 below, gives a p-value of 0.33 which is greater than the critical p-value of 0.05. Thus, we fail to reject the null hypothesis for homoscedasticity. Breusch-Pagan test is another way of checking heteroscedasticity. The null hypothesis is that the variance of the errors is constant against the alternative that the variance of the errors is not constant. By running this test, we can see in table 7 that heteroscedasticity does not exist in the model as the p-value is 0.7868. Hence, we fail to reject the null hypothesis at 5% significance level.

Table 7
Tests for Heteroscedasticity

Test Name	Test Statistic	Significance Level	Critical p-value
White Test/IM*	0.3308	5%	0.05
Breusch-Pagan Test**	0.7868	5%	0.05

* Ho: homoscedasticity, Ha: heteroscedasticity

**Ho: constant variance, Ha: heteroscedasticity

To check for the stability of the coefficients in the model, CUSUM (cumulative sum) test is applied. A plot of cumulative sum of recursive residuals is shown in figure 1 below. It is observed that the graph lies well in between the critical limits of 5% significance level. This is indicative of the fact that the short run coefficients of the model are stable.

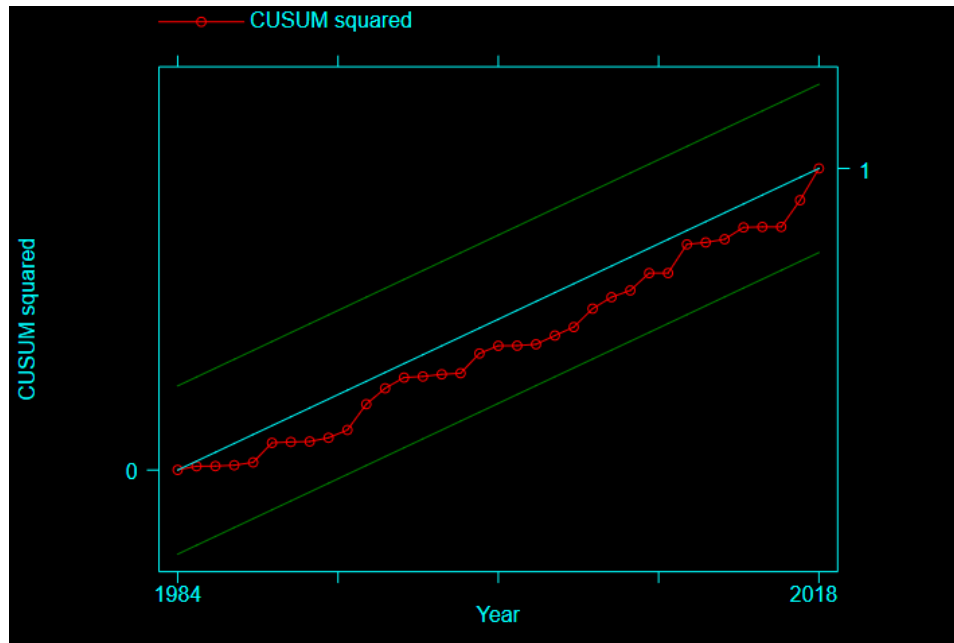


Figure A: CUSUM Test

A few other diagnostic tests to check for model stability are applied. Normality of residuals is checked by applying the Shapiro-Wilk test. A p-value of 0.248 is obtained which is evaluated against the null that the residuals are normally distributed. Since the p-value is greater than 0.05, we cannot reject the null and conclude that the residuals are normally distributed.

Furthermore, normality is examined graphically by plotting the residuals with the help of Kernel Density Estimation. Figure B shows the kernel density plot of residuals along with the plot of normal distribution. It can be observed that the residuals have almost a normal distribution which means that our model is stable to a significant extent. Moreover, figure C & D plots the standardized normal probability graph and the quantiles of residuals against the quantiles of normal distribution graph, respectively. It is apparent that both the plots are almost on the normal distribution line and no substantial deviation can be observed implying that the residuals are normally distributed. Having looked at the results of all the diagnostic tests we conducted, it can be concluded that our model is stable, and the estimates are valid.

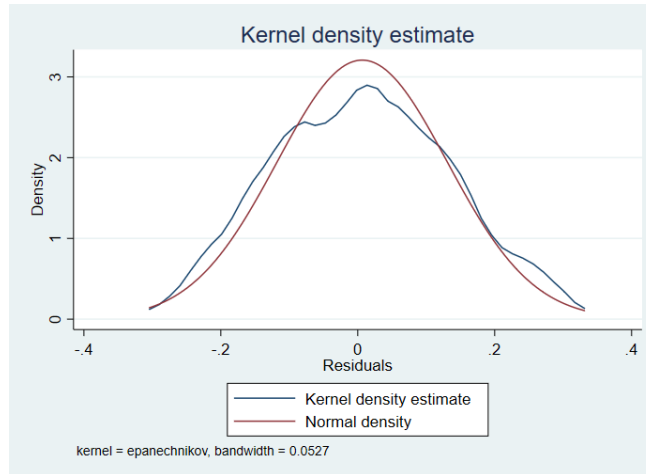


Figure B: Kernel Density Plot

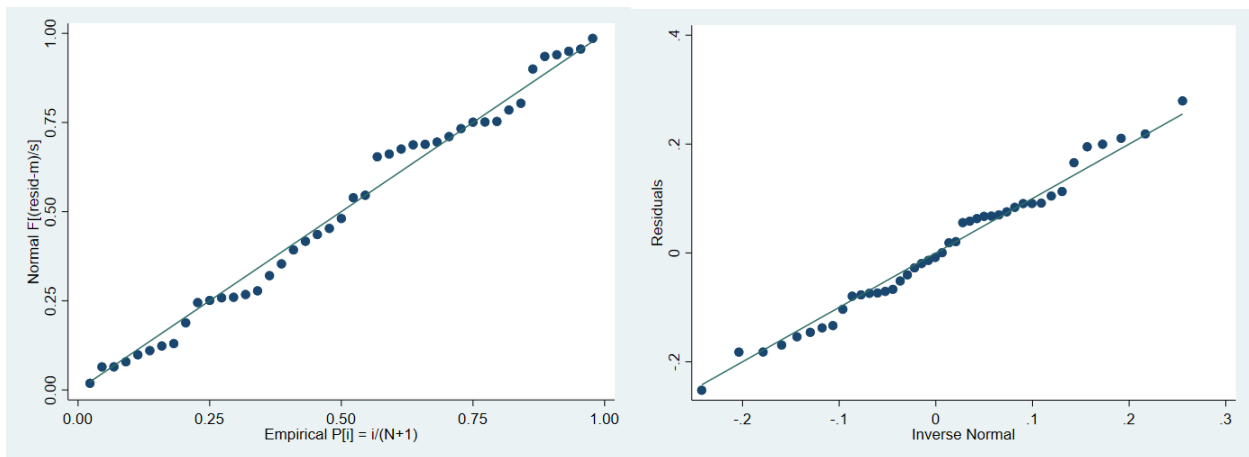


Figure C: Standardized Normal Probability Plot

Figure D: Quantiles of Residuals Plot

6. Conclusion

There have always been conflicting views on the issue of public debt in the history of economics. The impact of one on the other is still being debated and no consensus on it has been reached. Some economist argues in favour public debt whereas most others are against it. The severity of the issue is enhanced in the case of developing economies where the government has limited resources to finance its expenditures and must take loans to keep its operations running. Pakistan is a developing country often struggling to meet its fiscal obligations. The government

has to take bailout packages from national and international lenders frequently. Is this money good or bad for the country is a never-ending debate.

This study investigates the impact of public debt on economic growth of Pakistan. An empirical analysis of the annual data from 1976 to 2018 was conducted. The study bifurcates public debt indicators into two i.e. external debt and domestic debt while gauging the effect of each on the economy. Several other control variables that effect economic growth are also included in the empirical model to get unbiased estimates. We made use of ARDL approach as the variables were cointegrated with each other. Bound test showed that there exists a long run relationship between the variables. Therefore, ECM was applied to estimate long run and short run coefficient along with the error correction term.

Observing the estimates for long run relationship, it was revealed that external debt was negatively related with economic growth of Pakistan. This relationship is significant and is in line with our a priori expectation and the literature. On the contrary, domestic debt has a positive effect on Pakistan's economic growth. The results showed a significant relationship between these two variables. Moreover, that paying back debt and interest on it is not good for the economy as debt servicing has an adverse economic impact. The coefficient for this relationship was substantially high and significant. Results showed that the investment enhances economic growth in long run. Situation was similar for openness of the economy where the results stated a positive relationship between the two. The more a country liberalizes its trade and enhances the ease of doing business the more will it grow economically. Furthermore, the relationship between inflation and economic growth came out to be negative. This implied that the case for non-linear inflation curve is very strong here as the inflation in Pakistan has been on the high side in recent times.

The results for short run estimates were not that different from the long run estimates. External debt adversely effects economic growth in short run as well. For domestic debt, a positive relationship with economic growth was found as was in the long run case. Debt servicing was negatively related with economic growth however the magnitude of this negative relationship was much lower in short run. Similarly, inflation and growth were inversely related to each other. Apart from these, investment and openness were positively related to economic growth in short run. The results were significant at 5% significance level. Furthermore, the error correction term which shows the speed of adjustment of the economy after one year of a shock reported a value of 0.26.

This indicates an adjustment of 26% towards the long run equilibrium of the economy after a shock was observed.

A few key policy insights about the economy of Pakistan can be drawn from these results. Firstly, the perception about debt should be changed. Debt is not always bad for the economy. As was observed in the analysis, domestic debt was positively related with economic growth in short and long run. If the loan amount is spent wisely on public projects that create value, positive returns can be gained from them which could be beneficial for the economy as a whole. Secondly, huge emphasis is given to external debt as it is considered a last resort in a difficult situation. In reality however, external debt only accounted for 16% of the GDP in 2018 whereas domestic debt accounted for 32% of the GDP in same year. In context of the results obtained from this study, it can be stated that external debt should be discouraged, and government should give more importance to domestic debt rather than external debt. Moreover, investment should be encouraged and adequate measures to enhance the ease of doing business must be taken. Similarly, special attention must be given to the export sector in any case as it will help in boosting the economy.

Domestic debt is often ignored and under played. There is very little evidence on the relationship between domestic debt and economy in the literature. This study opens further avenues of research in the debt literature where we can dig deeper into the relationship between domestic debt and economic growth. Further instruments, indicators and tools related to domestic debt can be explored and good value can be added to the debt literature.

7. References

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8. Appendix

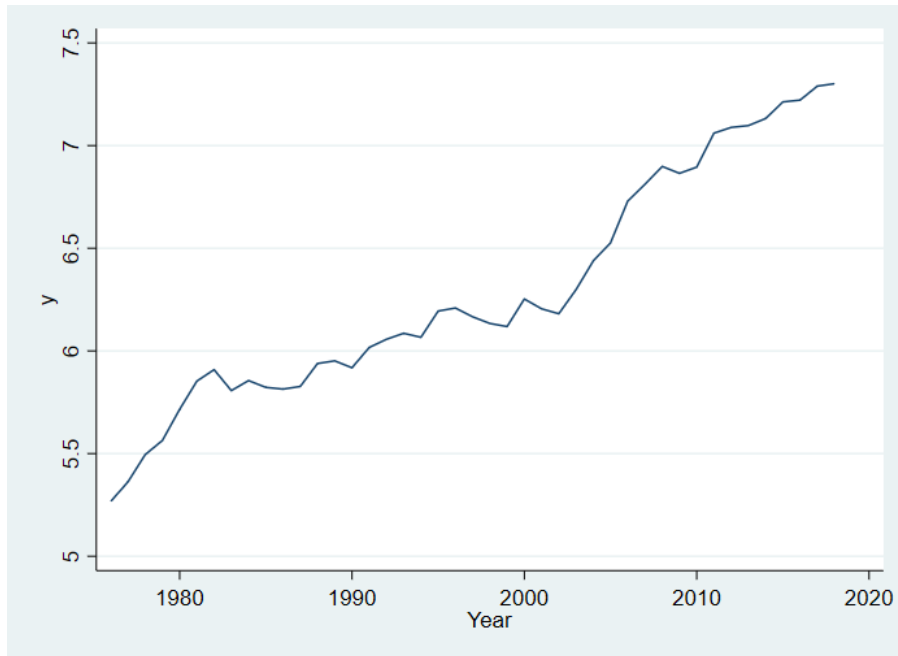


Figure 1.A: Time Series of GDP per capita

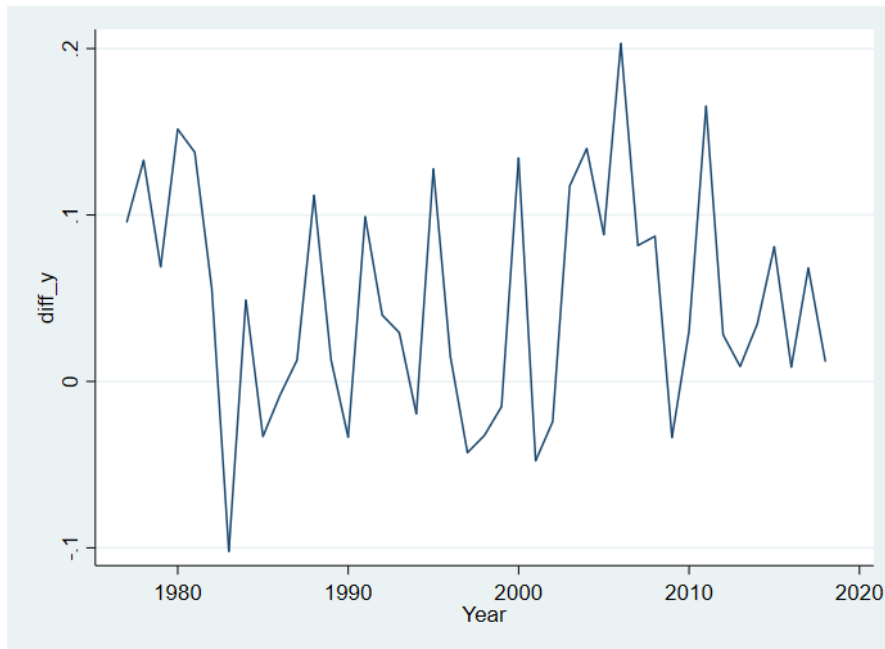


Figure 2.A: First Differenced Series of GDP per capita

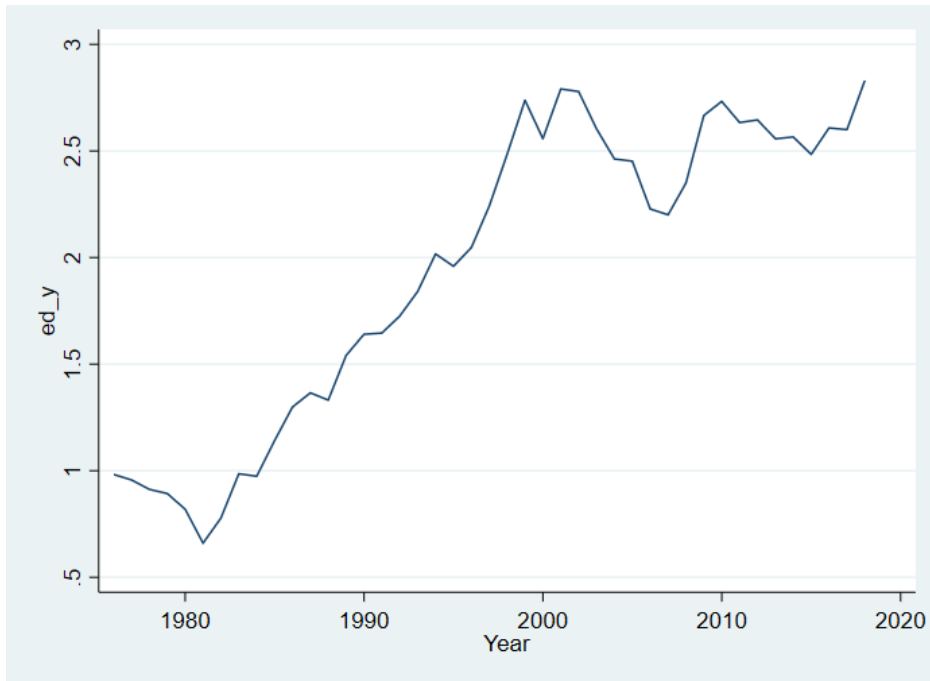


Figure 3.A: Time Series of External Debt

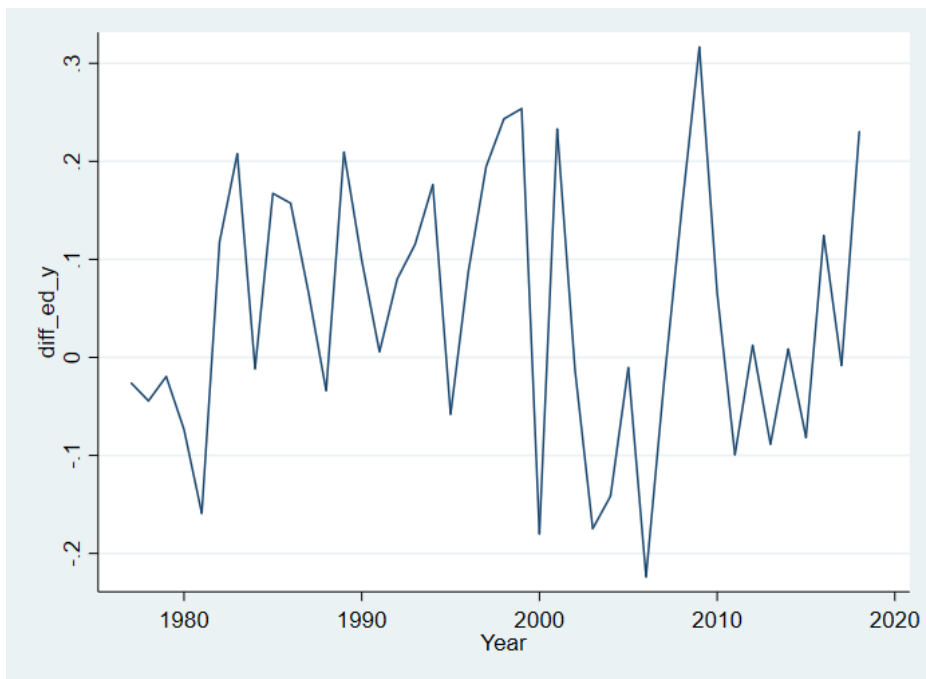


Figure 4.A: First Differenced Series of External Debt

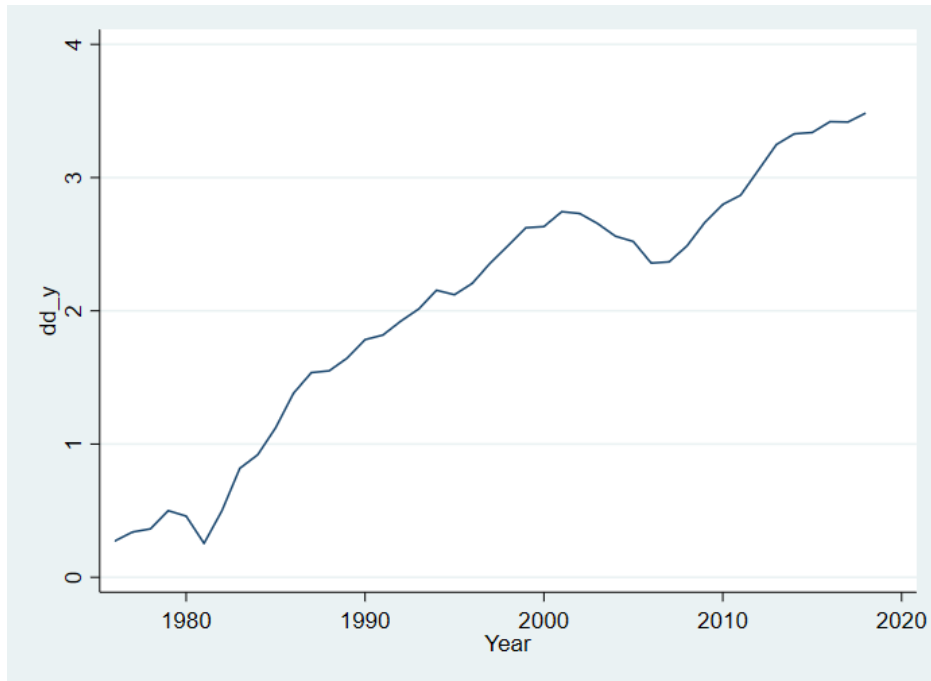


Figure 5.A: Time Series of Domestic Debt

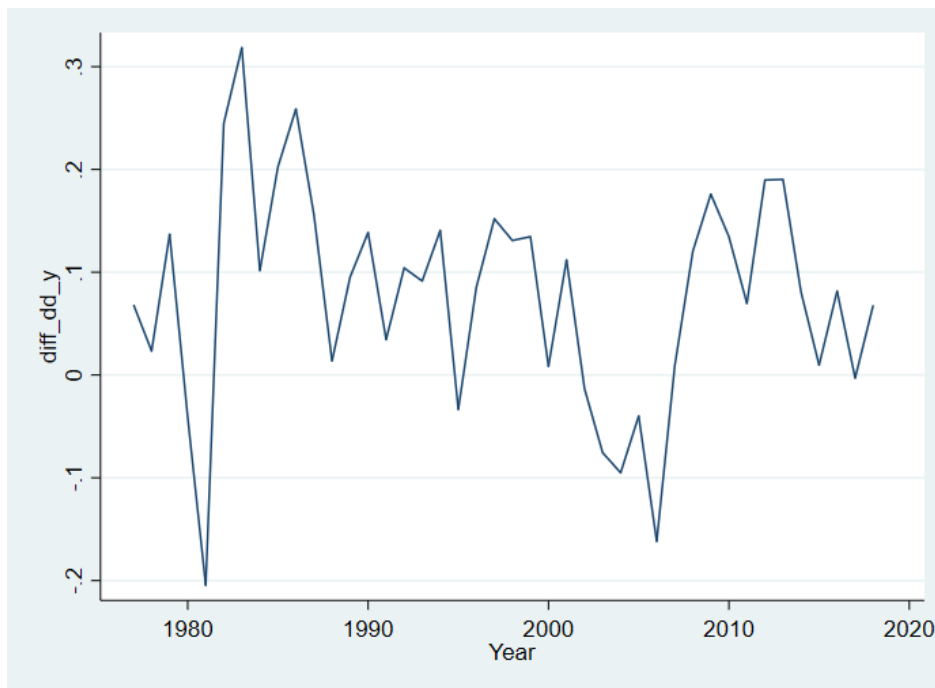


Figure 6.A: First Differenced Series of Domestic Debt

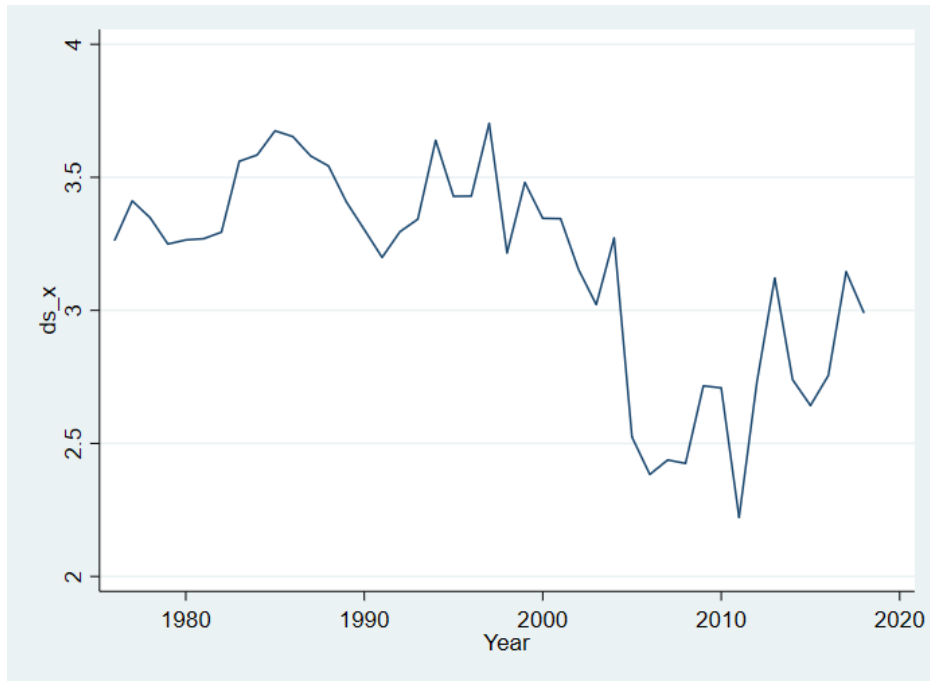


Figure 7.A: Time Series of Debt Servicing

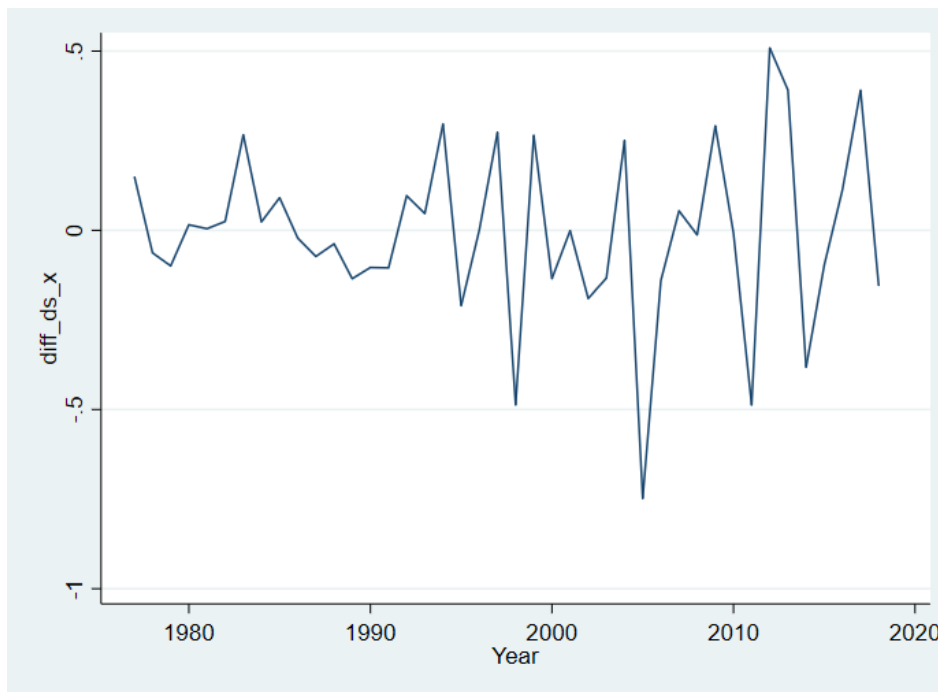


Figure 8.A: First Differenced Series of Debt Servicing

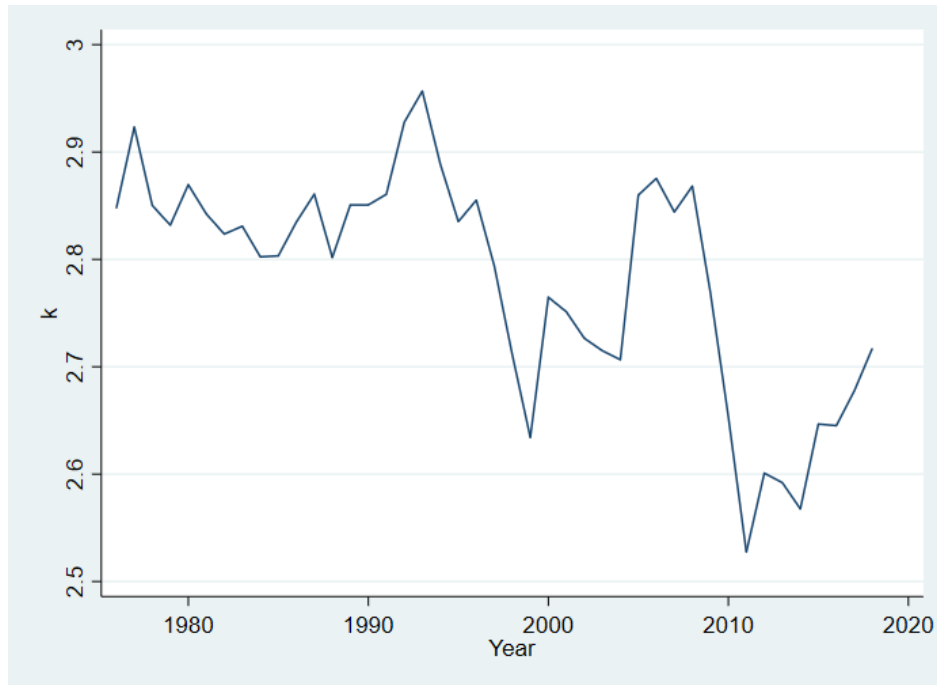


Figure 9.A: Time Series of Investment

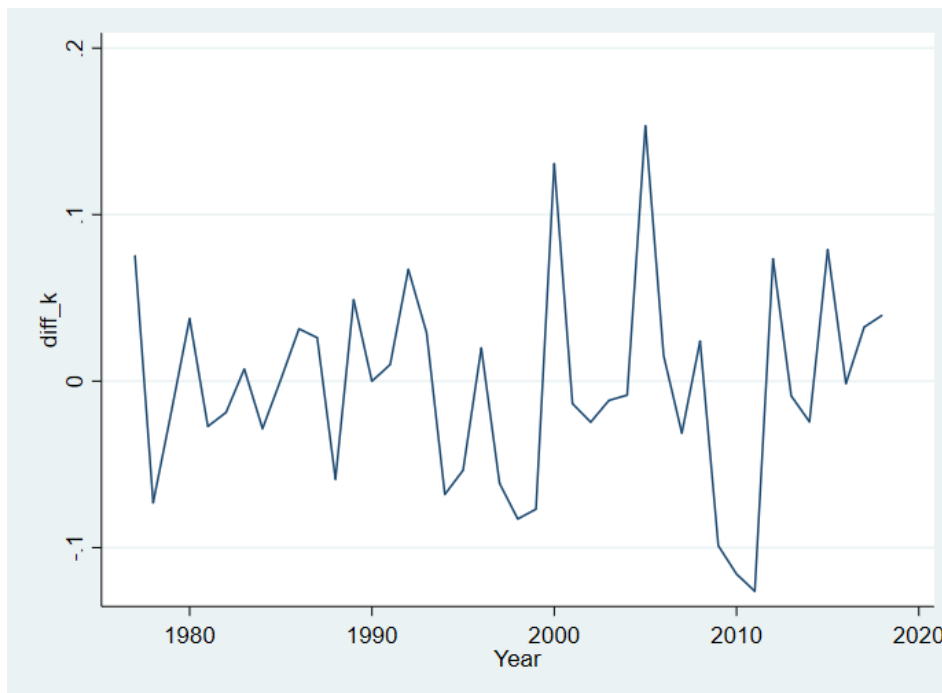


Figure 10.A: First Differenced Series of Investment

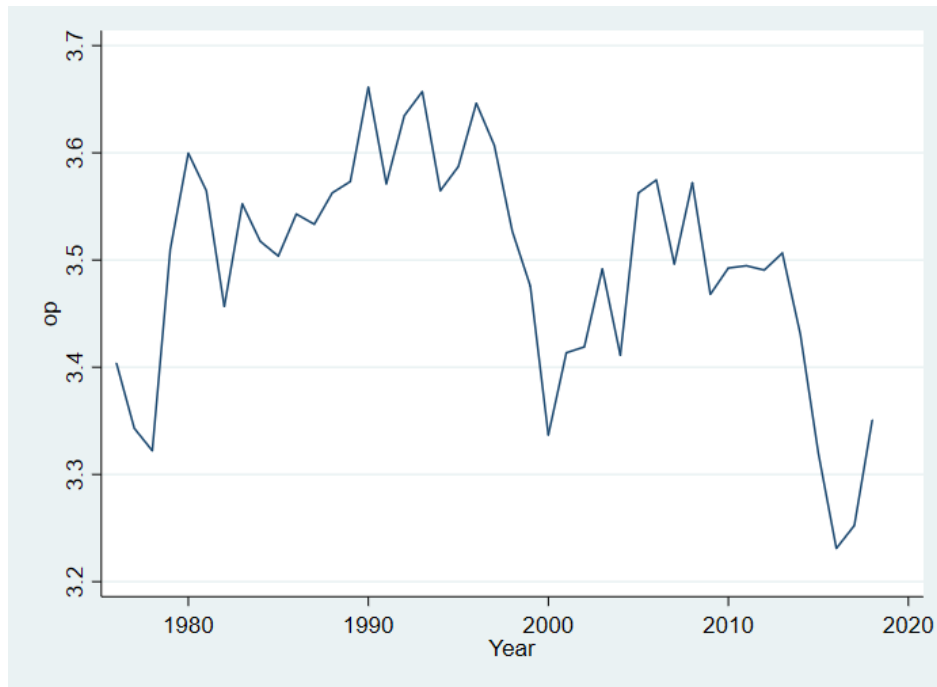


Figure 11.A: Time Series of Openness

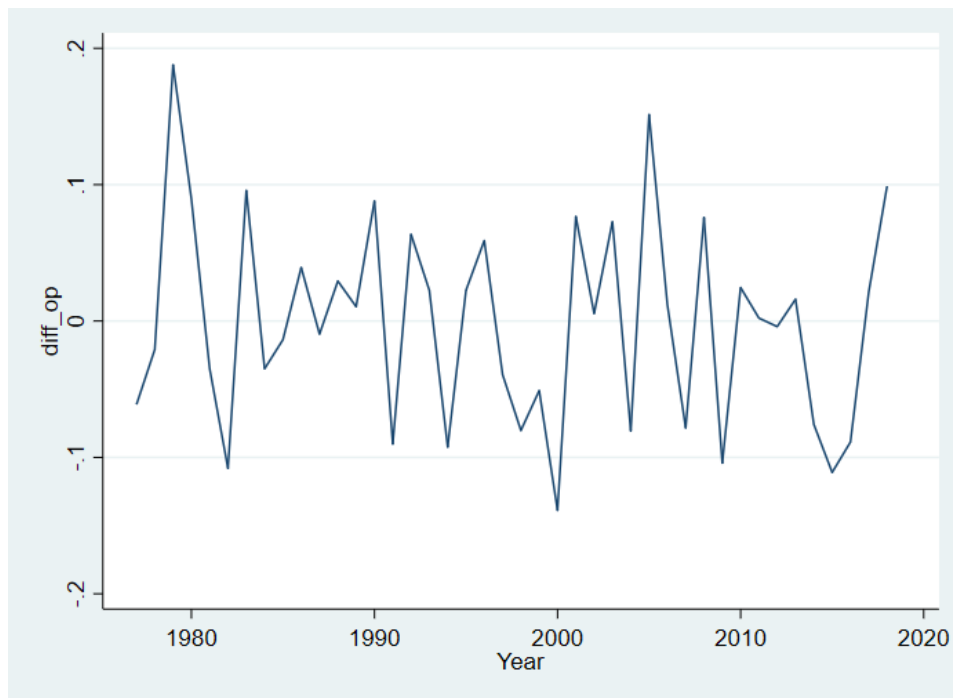


Figure 12.A: First Differenced Series of Openness

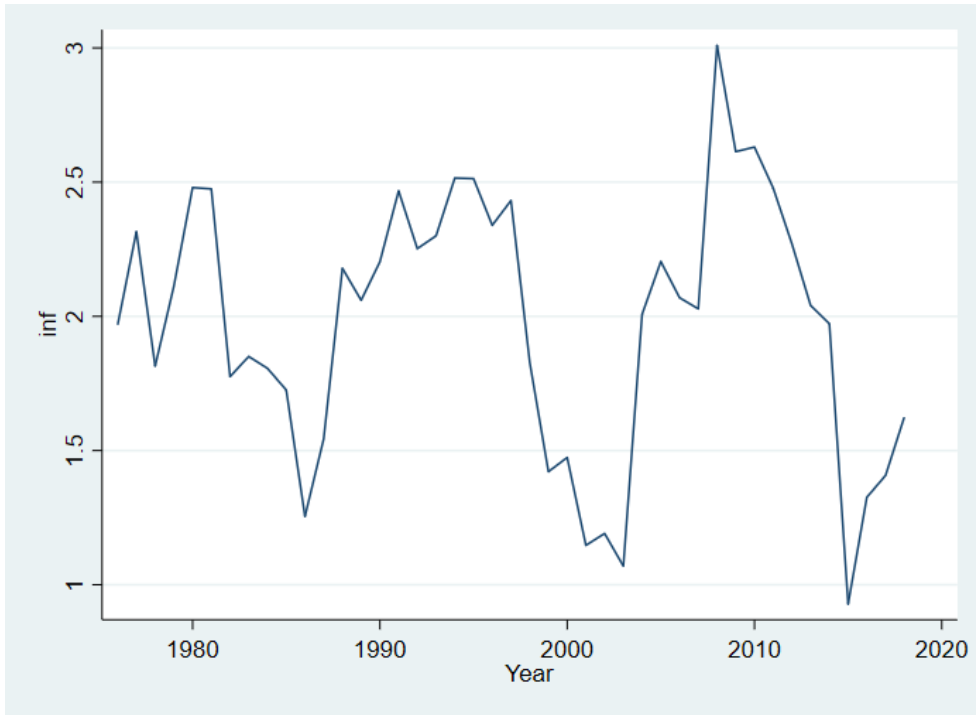


Figure 13.A: Time Series of Inflation

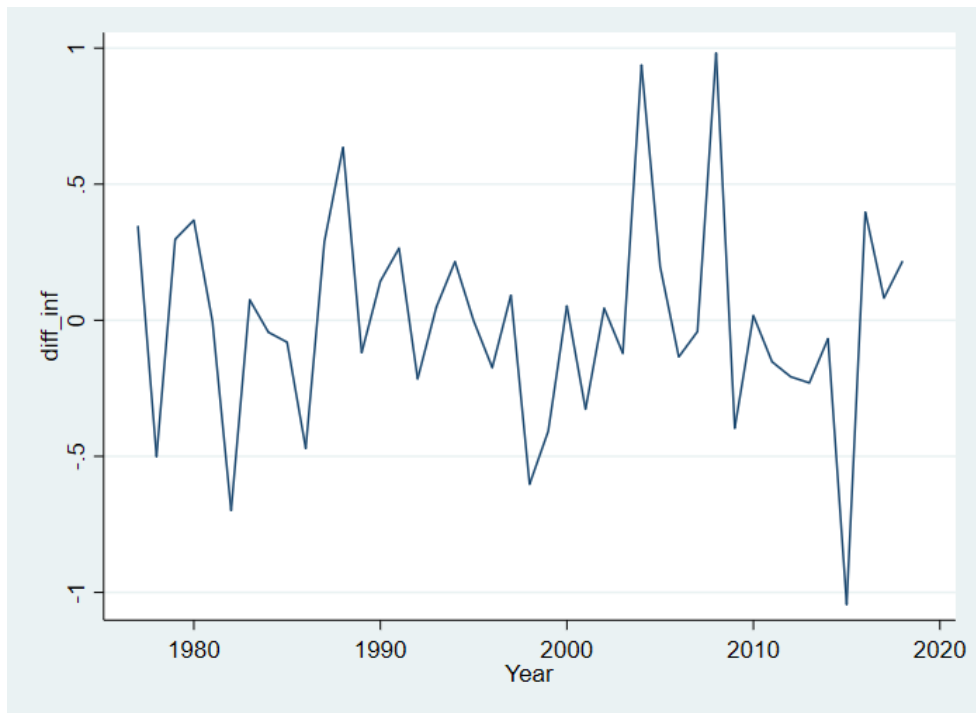


Figure 14.A: First Differenced Series of Inflation

Table 1
Lag Selection Criteria

Lags	AIC	HQIC	SBIC
0	-2.25	-2.14	-1.95
1	-12.61	-11.75	-10.22
2	-12.52	-10.91	-8.04
3	-12.65	-10.30	-6.09
4	-19.00*	-15.90*	-10.34*

Table 2
Individual Variable Lag Selection under AIC

y	dd_y	ed_y	ds_x	k	op	Inf
4	3	4	4	4	4	4