

**Are deficits Inflationary? Role of Monetary and Financial institutions:
Empirical Evidence from Asian Economics**



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CERTIFICATE

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ABBREVIATIONS AND ACRONYMS

AR	Auto-regressive
CBI	Central Bank Independence
CPI	Consumer Price Index
FTPL	Fiscal Theory of Price Level
GDP	Gross Domestic Product
GMM	Generalized Method of Moments
OLS	Ordinary Least Square
PVT	private Sector Credit
TOR	Turn Over rate of Central Bank governors
WDI	World Development Indicators

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ABSTRACT

Are deficit inflationary? This study employed System Generalized Method of Moments to analyze the inflationary impact of budget deficit for sampled Asian economies. Study utilized the theoretical framework of Neyapti (2003) to analyze the association between budget deficit and inflation. The primary objective of this research is to find whether inflation increases or decreases with budget deficit. Second objective is to investigate the role played by central bank independence and financial markets in explaining the inflationary impact of deficits. Asian economies are selected due to their peculiar nature that the central banks are not completely independent and furthermore financial markets are being reformed and developed. This positive transition of these emerging Asian economies is interesting to study for our hypothesis. Study utilizes the panel dataset from 1981-2010 on eleven Asian economies. Results show that deficits have inflationary impact both through direct and indirect mechanism. However indirect link growth in money supply is stronger and it enhances the significance of budget deficits in the selected Asian economies. On the other hand our results suggest that deficits are particularly inflationary when Central bank is partially independent and not enjoys freedom in following its targets as turnover rate (TOR) coefficient is significant and shows that political pressure is more severe than the legal structure that forces the financing of deficit through the creation of money. Secondly less developed and inefficient financial structure also plays role in explaining the inflationary impact of deficit as no other easy option exists for fiscal authority to finance its deficit other than Seigniorage. The major implication from this study reveals institutional structure should also be looked deeply in analyzing the inflationary impact of deficits.

Chapter 1

INTRODUCTION

Inflation, fiscal deficit and money-supply always remain issue of critical importance at individual level as well as their collective impact on the economic activities is also of great importance. Different schools of thoughts presented diverse views regarding behavior of each variable. Furthermore their impact and remedies are also different. If we take the link between deficit and inflation a lot of views exists, but two of them are more prominent.

The first argument is based on the rationale that the part of the budget deficit which government finances by borrowing from the central bank leads to an increase in the money stock and higher money stock will automatically leads to inflation.¹ But there exist some doubt regarding this point of view that in an un-utilized resource economy high level of deficit may lead to increase demand and output.

The counter argument that links fiscal deficits and inflation is that in an economy in which the output of some essential commodities cannot be increased, the increase in demand caused by a larger fiscal deficit will raise prices. There exists an ample literature which focuses on the indirect as well direct link of the two. The empirical and theoretical literature examined both sides of the coin in this aspect. Inflation is the end product of deficit and money supply, so both held responsible for dynamics of inflation.

The main question arise why there is deficit? What are main sources of financing this deficit? For this purpose there is need to clear the basic rationale behind the deficit. Deficit is a situation in which federal government expenditure are more than its generated revenues. Low revenue generation can be linked to many factors like low tax base, tax evasion and reduction

¹ See Olivera (1967) and Dutton (1971).

in tax rates.² There are usually two ways to reduce the deficit either to increase tax revenue or reduce expenditure. To reduce the current expenditure is not possible way for the benevolent government as it spends on both utility enhancing and productivity enhancing expenditures for this reason for most of the developing economies already in economic slack condition further curtailment of social utility by reducing expenditures is not socially acceptable idea and to increase the revenues is not easy, as structural rigidity in tax structure and revenues is very obvious, tax evasion is evident behavior as well political and feudalistic lobby pressure is also common in imposing tax on agrarian structure ,that put government in difficult situation to raise revenues specially from taxation.

Keeping in view the structural bottlenecks in developing economies, two options are easy and hence possible one is borrowing from public or from banks. If financing is through selling government bonds to the public then deficit will not create any inflation, as no new money being created. But if borrowing is from banks then new money will be generated and this will expand monetary deposits, and these increased revenues will be spent by the government and thereby enters permanently into the spending stream of the economy, raising prices and causing inflation. Thus, deficits are inflationary to the extent that they are financed by the banking system; and deficit is not cause of inflation if financing is done through bonds selling.³

Budget deficit link to inflation can be broken by central bank if it refuses to monetize the deficit e.g. refusal from buying the bond issued by the government. In this case how much independent a central bank is in following its goals and objectives is very important. The more independent the central bank is, more it would be able to control and work on price stability

² Tax evasion and tax administration cost is common feature of many developing economies as cited by (Edwards and Tabellini:1990)

³ See Miller (1983).

strategy. Central bank that is under the influence of political pressure will not credibly commit to stable price targeting behavior (Mas: 1995)⁴. It is also argued in literature that independent monetary policy serves as agent that creates incentives for fiscal discipline on behalf of government as the one who is more inflation averse will be more committed to maintain low price.⁵As government and central bank are two main actors in economy persuading two distinctive goals, fiscal authority is more concerned about output growth and monetary policy is rather concerned about price stability objective.

Tempted monetary expansion out of budget deficit indicates that monetary authority is not independent and is under the pressure of central government actions. It is crystal clear that in developed nations central bank can adopt independent monetary policy for longer period without having sustained fiscal deficit. In developing economies financial sector has not fully developed and failed to grasp its basic roots in economic structure. Along with fragile financial sector, political pressure exerted on the central bank to monetize the deficit, are crucial reason that fiscal deficit serve as major source of price increase. Deficit to inflation causality will follow through money supply, if main source of financing is seigniorage, as cited by many studies.⁶ The literature on budget deficit and inflation does not provide a clear picture and the evidence is also not clear. In case of developed nations many studies found no evidence in favor that deficit are the source of inflationary pressure (King and Plosser's:1985, Blanchard and Fischer's:1989, Click: 1998). While in developing economies studies found positive relation between deficit and inflation. Chang (1994), Metin (1995, 1998), Rahman et al. (1996) Darrat (2000) Catao and Terrones (2001) and, Narayan and Seema (2006). However many studies like Dwyer (1982), Brown and Yousefi (1996), Hondroyiannis and Papapetrou (1997), Abizadeh and Yousefi (1998) found insignificant results. So no clear picture is

⁴ As public observe the inconsistent response and actions of central bank over time.

⁵ See Alesina and Summers (1993) Rogoff (1985) and Cukierman (1992).

⁶ Hamburger and Zwick (1981) Dorndusch *etal* (1990) Gupta (1992) ,Easterly and Hebbel (1993)

portrayed by the empirical literature. Source of financing is very important in relationship between deficit and inflation. Wallace and Sargent (1991) arguments focus that if government is facing deficits and running short of revenues it has to finance it sooner or later with money.

1.1 Role of Institutions

Role of institutions was not much focused by literature till 1990s. Later on, the roles of different political and financial institutions were emphasized. Paldam (1987) was first who explored the impact of political instability on inflation. After that significant research carried out on institutional factors. North (1991) gave significant importance to institutions, whether they are political, social, or economic. He holds a view that many economies are prosperous because of efficient and strong intuitions. He regarded the success of England to the evolution of institutions.⁷ North argues that

"Institutions provide the incentive structure of an economy; as that structure evolves; it shapes the direction of economic change towards growth, stagnation, or decline".

Intuitions as defined by North are devised by humans and shows there attitude toward economic, social and political activities and institutions play role in mitigating the uncertainty and provide a stable and favorable environment for human interaction. Efficient institutions are powerful tools that have shaped the growth strategies of many developed world and poor institutions are the sticking leech in many developing economies.

Historical facts revealed that these are the institutions that have molded many economic developments. North takes the case of US economy; economic history reveals that institutional framework that laid the foundation for economic development and economic growth in nineteen century were, Change in constitution, change in social attitude toward hard work.

⁷ See North and Weingast (1989).

These social and political institutions provided basis for political and social and economic actors to invest in maximizing attitudes that resulted in more economic development and increased productivity. Attitude toward work give rise to more investment pattern in education. Institutions with efficient and strong basis also reduce many social conflicts, as Easterly (2000) asserted on this point that strong and high quality institution reduce the rent seeking behavior, reduce possible of occurrence of genocides, ethno-linguistic fragmentation, and lowers the risk of wars.⁸This show significant importance of institution as highlighted by many studies, thus role of institutions can be substantial in explaining the deficit and inflation relationship specially in developing economies, where institution quality is very low in almost every institution political, social or economic.

1.1.2 Role of Financial Sector and Central Bank in Inflation dynamics

Financial sector and central bank are two financing institutions of any economic structure; either economy is developed or developing one. Both are crucial in explaining the inflationary deficit impact in different economies as explored by Neyapti (2003). She explored the impact of both financial sector development and central bank independence in explaining the inflationary impact of deficit in panel data setting. The degree how much financial sector is developed and central bank is independent, not only predicts how much monetary accommodation of deficit will be in certain period but also help in predicting future expectations of monetary accommodation of deficit⁹. Deficit is a critical issue that is thought to be associated with many economic problems like inflation, debt crisis, poor investment and growth.

⁸ See Easterly (2000)"Can institutions resolve ethnic conflict? And Knack and Keefer (1995) also explored role of institutions on corruption and lack of rule of law.

⁹ Bilin Neyapti (2003).

Deficit is not only factor associated with inflation but there a lot of other elements that are cause of inflation. Like growth in output, openness, exchange-rate, direct and indirect taxes, oil prices etc. To finance deficits on average developing economies are more relied on the seigniorage then developed. The region of south Asia and other developing countries are amongst those where deficit are soaring with time. Asian countries are developing ones and have many characteristic in common like poverty, unemployment, overpopulation, illiteracy, agricultural background and less developed financial structure and less stable political regimes.

1.2 Objective of the Study

The main objective of the underlying study is

1. To find whether deficits are inflationary in selected Asian economies or not?
2. To find out whether budget deficits are inflationary in presence of Central Bank independence or not?
3. To see whether deficits are inflationary in the presence of developed financial markets or not?

Asian economies are selected because of these two issues as central banks are not enjoying significant independence in following its targets and financial markets are still in the phase of development. In order to achieve the objectives we employ appropriate system GMM technique as model specification is of dynamic in nature. Panel sample is selected from Asian economies and period of analysis for this study is from 1981 to 2010. Arellano and Bond (1991) difference Generalized Method of Moments (hence forth will be used as GMM) and Blundell and Bond (1998) system GMM are most commonly used ones.

1.3 Organization of the study

The rest of the study organized as follow, chapter 2 will give extensive literature review on deficit inflation relationship and role of CBI and financial sector in explaining the dynamics of inflation. Chapter 3 will discuss theoretical model and econometric methodology used in the study. Chapter 4 will give detail about data used and variable construction. Estimated result and interpretation in detail is given in chapter 5 while chapter 6 concludes the study and will give policy recommendations based on empirical result.

Chapter 2

DESCRIPTIVE ANALYSIS OF ASIAN ECONOMIES

The word “diversity” is justified to define and describe every economic, social, political, cultural and religious aspect of Asian economies. Every country or economy in Asia whether it is south, east, west, north or central, are diverse and unique to other in their origin, history, development ,growth, socio-economic setup, religion ,language ,culture, ethnicity, politics, geography, environment etc. This continent is the most populous where 60 % Percent of world population resides¹⁰. Ethnic, cultural and religious diversity is relatively more sever, that is difficult to find in any other continent. Indonesia is the only and most ethnically diverse country which is comprised of some 300 hundred ethnic groups who practices different major religions. Eleven languages and eighty-seven dialects are spoke in Philippines. Economically Asia is also diverse regarding, poverty, national income, GDP per-capita, sectoral composition and overall development level.

Asian countries are developing ones and have many characteristic in common like poverty, unemployment, overpopulation, illiteracy, agricultural background, less developed financial structure and unstable political regimes. South Asia as a region is underdeveloped where approximately 20 per cent of the world’s population occupies only about 2.7 per cent of its landmass. If we compare two regions south Asia and south East Asia both are also very diverse in economic, social and political aspects. China, Japan, India, South Korea and Indonesia are the largest economies in Asia.

¹⁰ See "[World Population Prospects: The 2010 Revision Population Database](#)". United Nations. April 15, 2011. Retrieved 2012-04-21.

The region of south Asia and other developing countries are amongst those where deficit are soaring with time. However some progress is made among countries to reduce the rising fiscal deficit in decade of 90,s. Countries had to reduce their fiscal imbalance to fewer than 10 per cent of their GDP while in the earlier decades fiscal imbalance in excess of 10 per cent was the norm for a majority of these countries.

2.1 Deficit and Inflation in Asia

Inflation and deficit are major concerns of many Asian economies. Low inflation and sustainable fiscal balance are two major economic goals for economy. The budget Deficit remained high persistently. While different shock also works as amplifiers for prices in Asian economies. Due to lack of sound financial position and less developed market structure these economies remained more prone to shocks. Political setup of these economies is more volatile and sustainability is rare for longer period of time. Large non-developmental expenditure, mostly politically motivated, remained more than revenue collection. Political motives like focusing on median voter¹¹ and capturing more voters always support politician to spend on expenditure that make his supporters more satisfied. As a result excessive expenditure which is always more than revenues resulted in deficit of budget position in south as well as in all other Asian economies. South Asian economies are running deficits out the sample period 1981-2010. If we look at the decade of 80s; deficit remained more than 10 percent in south Asia. The decade of 1990s witnessed some improvement in reducing budget deficits to less than 10 percent.

In 1980 fiscal balance of Bangladesh was -9.1 of GDP which decreased to 6.1 in 1999. India's deficit was -5.1 in 1980 which reduced to -4.1 in 1999. Pakistan was experiencing deficit of

¹¹ Concept is derived from median voter theorem, which states that in “majority rule” voting system that policy or outcome will be selected preferred by median voter. During electoral period and for policy decision politicians always try to capture the median voter as he usually represents the preferences of the average voters. Harold (1929) and Congleton (2002).

budget -4.8 in 1980 and -6.3 in 1999. While for Srilanka it was -22.5 in 1980 and it decline to -8.9 in 1999. The overall low revenues due to low tax base and rate, more reliance on the indirect taxes and foreign trade can be considered as major constraints on these economies. Average tax as percentage of GDP was 10.4 % in 1980s while it increased to 10.8 % in major south Asian economies including Pakistan, India, Bangladesh, Srilanka and Nepal.¹² However due to external shocks like oil and food prices hikes, financial crisis of 2007-2008, also due to some political and domestic situations, deficit and inflation consistently fluctuated between high and moderate values during period 2000-2010.

The Decade of 2000 brought economic fluctuations for developing world and especially for Asian economies. This period begins with sustain fiscal account and rising growth trends up-till 2007. Most of the economies copped to manage all macroeconomic indicators but financial shock brought severs challenges for Asian countries. It is evident that fiscal deficit in major south Asian economies rose after and during shocks. So financial shocks left deep impact on all Asian economies and fiscal deficit, inflation and growth rates are key indictors which are of main concern of this study. To see what situation was prevailing before and after crisis, coming section will focus on it.

2.2 CBI, financial sector and Governance in Asian Economies

Dynamic inconsistency model presented by Prescott and Kydland (1977) and later on Barro and Gordon (1983) showed that there exists tradeoff between unemployment and inflation rate so government always set inflation rate at higher level then optimal level. These model provided basis for financial or especially central bank independence reforms in many countries in 1990s. The concept of conservative governor of central bank regarding inflation later on provided by Rogoff (1985), who further explored that more independent central bank is more

¹² See table A1 in appendix for details of fiscal balance, tax revenues and expenditure of south Asian economies for different time periods.

inflation averse and more effective in targeting price. These reforms in many economies promised more independence to central banks in economic, legal and political aspects of independence. Central banks in most of the developed nations are quite independent from political pressure but in developing nations they are not. Reforms in developing world however promised independence to the central banks in documentations but there significant implication is difficult to find in many developing economies like in Asia. Many Asian countries are still lagging behind in assuring the independence to central banks. Empirical studies showed more independent bank exert positive impact and lower inflation rates as Alsena (1988) confirmed this relation using bade and Parkin index, which was first study conducted to explore the relationship between inflation and CBI.

Asian economies have weak institutions and shallow market structure. Political and government indicators also show corrupt, volatile and rent seeking attitudes. Monetary authority often faced political pressure from fiscal authority in adopting its goals and targets. Turnover rates of governors, political replacement of high officials, appointment of governor with the new political government, shows how much government interfere in policies of central bank. Cukierman (1992) used turnover rate as proxy for the measuring central bank independence in developing economies and founded that along with economic, political independence is low in these economies, as illegal turnover rate is higher. Even strong economies like India Japan, Singapore and Korean banks are not free from political pressure. China's bank reports to communist party, Thailand bows to military leaders, bank of Japan acts according to will of politicians, Indian bank pressurized by the politicians to control foreign involvement in domestic bond market, which is not duty of central banks ,similarly Philippines, Korea and other Asian economies Like Pakistan Bangladesh and Srilanka etc are not different from others.

Political regimes are also volatile, dictatorship; autocracy, democracy, and military government of and on grab the position. Immature, less sensitive to public problems and needs, self-motivated politicians have destroyed the economic and political setup of many economies like Pakistan, Bangladesh, Thailand, Srilanka etc. Weak governance is considered major impediment in achieving growth trends and alleviating poverty. South Asian economies are more risky than East Asian as they are more prone to corruption, lack of property rights, inefficient public administration, gender discrimination, ethnic and social conflicts. Countries with volatile output and dispersed political power are the most likely to run pro-cyclical policies as shown by Lane (2003). Security in different regions of Asian economies became greatest obstacle of development and integration.

2.3 Financial Shock 2007-2008 and Asian Economies

Financial liberalization started in East Asian economies in early 1980s, while South Asian region liberalized its financial markets in late 1990s. These regulations started on the footsteps of developed nations without realizing and analyzing the initial structure, laws and regulation. This result in inefficiency and ended in the financial crises of East Asian economies in 1997-1998. (Rao, Tamazian and Singh: 2009).

Financial crisis of 2007-2008 by and large hit almost all the economic setup of every existing economy around the globe. Developed nations were the first one which faced the layer of this shock, which later-on grabbed and shook the developing and emerging economies. The aftermath impacts of this shock highly focused by researchers around the globe. Economists analyzed shock impact on different sectors of economies. It is clearly evident from various research papers, developing and emerging economies badly crashed by this financial set-back. Asian region has Multi-faced composition of developing, emerging and poor economies. After 2007-2008 crises many emerging economies lost their growth trends for which they have

struggled hard. Financial shock, shaken almost all sectors in all Asian economies. It slackened economic growth, widened the current account and fiscal deficits, intensified inflation rates, diminished foreign exchange reserves and depreciated the domestic currency of many economies. Before financial crisis global fuel and food price hikes also badly affected Asian economies and financial shock further increased woes of Asian economies.

Important channels through which shock entered in the Asian economies is through financial integration and exports. In south Asian economies excluding India, all other economies have less developed financial system due to which financial shock not paved its way through this link strongly, but as exports are main ingredient of many south Asian countries that tied them to many developed region like US and Euro zone. Asian exports decline at least 30% that shows contraction of Asian products demand in western markets. But other picture also portrays that Asian imports also contracted due to softening of demand in domestic economies in Asia.

Firstly glancing on overall situation before and after crisis in major south Asian economies it appeared that shock badly hit all key economic indicators. Before financial shock almost every economy was showing good performance. Taking GDP growth in Bangladesh it was on average 5 percent from 2000-2007 and it reached to 6.4 percent in 2007. In Pakistan GDP reached to the level of 9.0 in 2005 to 6.8 in 2007. Main factors bring these growth levels were increasing trends in manufacturing and service sectors. India is strong emerging economy and one of the members of BRIC economies. Which are rapidly growing economies then compared to other south Asian economies GDP raised from 4 in 2000 to 9.7 percent 2007. Sri Lanka despite natural disasters like tsunami in 2005 showed growth of 6 percent per annum.

Fiscal deficit position in Bangladesh was quite sustainable and with limits on 3.2 percent from 2004-2007 but rose to 4.7 % in 2008 after the shock. India fiscal deficit were at 7.5 in 2004 as

percent of GDP and it decreased to 6.8 due to measures taken for stabilization of these economies. In Pakistan however deficit was low at level of 2.9 in 2004 and it gradually increased and then reached to level of 5.2 percent of GDP after the shock in 2009. Srilankan economy deficit maintain digit between 7 to 8 percent as percentage of GDP and after crisis it still stand at 7 % as percentage of GDP in 2009.

Regarding the inflation rates Srilankan economy was experiencing double digits inflation before crisis starting with 9.0 in 2004 to 15.8 in 2007 which further climbed to 6 percent in 2008. Pakistan inflation however maintained in single digits with 7.8 in 2007 pre shock period but it entered in double digits in 2008 and 2009 post shocks periods. India remain successful in maintain low inflation rates, while Bangladesh inflation rates accelerated to 9.9 percent on average in 2008. Almost every economy in south region maintain sound current account and stability was also maintained in nominal exchange rates in periods before crisis. Post crisis reveals that Pakistan and Srilanka are major stricken economies that faced deterioration in current account deficit. In case of Pakistan it raises from 4.7 in 2007 to 8.4 as percentage of GDP in 2008. While in Srilanka it was at level of 4.5 in 2007 and increased to 7.1 percent in 2008. Employment level also effected due to these negative financial shocks in major south Asian economies like in Bangladesh 20,000 contract workers in jute industry layoff in month of January 2009 as reported by Bangladesh Jute Spinner Association. So overall it is clearly evident that financial shock hit all south Asian economies by and large.

Looking at East and South East Asian economies it can be said that they also affected by the financial shock. Japan which is strong manufacturing industrialist in East, badly hit by shock in terms of decline in growth trends, exports and capital formation. As growth declines very sharply from 2.3 % in 2007 which declines to -1.1 in 2008 but ended in negative digit of -5.5 in 2009. Korea which is knowledge based economy of East Asia also faced slowdown of

growth rate. The GDP growth remained 4 percent from 2004 to 2007 but after shock it declined to rate of 3.0 % in 2009. Now turning towards major South East Asian economies, including Thailand, Philippines, Singapore, Indonesia, and Malaysia. All these economies growth trends declines very sharply, like in Singapore 3.4 % in 2007 to -8.4 in 2009. Malaysian economic growth declined to -0.2 in 2009, from 6.3 in 2007, Thailand stand in growth prospect at level of -2.0 % in 2009 from positive growth rate of 4.9 in 2007 and Philippines growth rates declined to 2.5 in 2009 from 7.2 in 2007.

Financial shock also accelerated inflation rates in these economies Korean economy experienced increase in inflation at rate 2.5 in 2007 to 4.7 in 2008. In Indonesia it jumps from 6.4 in 2007 to 10.3 in 2008, Malaysian economy prices increase to level 5.4 in 2008 from 2.0 in 2007 while for Thailand prices rose to 5.5 on average in 2008 from level of 2.2 in 2007. Singaporean economy experienced inflation rate 6.5 in 2008. Similarly Philippines economy is no exception to this and it experienced inflation rates of 2.8 in 2007 and 9.3 in 2008.

Now if we look at the deficit situation in all East and South East it appeared that although there is fluctuation in deficit in these economies after financial crisis, but these economies remained far better position than south Asian economies. Fiscal balance remained more sustainable in Singapore than other south east in economies. Fiscal balance of Singapore after little fluctuation 9.6 in 2007 stands at 5.7 in 2008, but Singaporean economy faced severe decline in growth rates.

Thus it is concluded that financial crisis of 2007-08 was devastating for Asian economies that impact badly all economic indicators, especially deficits, GDP growth rates and inflation rates which are main concerns of this research. To capture the impact of financial shock on inflation level dummy variable is used in this study. Degree of financial shock that hit economy depend on how strong and sustainable its macroeconomic condition with low inflation, sustain fiscal position, low current account deficit, and healthy foreign exchange reserve position which act as shock absorbers and mitigate the effect of shocks. Strong institutions are also highlighted by literature as well to be one that work as mitigating factor and make economy less prone to such shocks.

TABLE 2.1: Growth rates, fiscal deficit and inflation rates of South Asian and East Asia.

Countries	GDP growth rates					
	2004	2005	2006	2007	2008	2009
Bangladesh	6.3	6	6.6	6.4	6.2	5.9
Bhutan	7	6.6	6.4	14.1	11.5	5.5
India	8.5	7.5	9.5	9.7	9	6.9
Japan	2.7	1.9	2	2.3	-1.1	-5.5
Korea	4.7	4.2	5.1	5	2.5	-3
Maldives	9.5	-4.6	1.8	7.2	5.7	1
Nepal	4.4	3.2	3.7	2.7	5.3	3
Pakistan	7.5	9	5.8	6.8	3.7	1.2
Srilanka	5.4	6.2	7.7	6.8	6	4
Indonesia	5	5.7	5.5	6.3	6.1	3.6
Malaysia	6.8	5.3	5.8	6.3	4.6	-0.2
Philippines	6.4	5	5.4	7.2	4.6	2.5
Singapore	9.3	7.3	8.4	7.8	1.1	-5
Thailand	6.3	4.6	5.2	4.9	2.6	-2
	Fiscal Deficit As % of GDP					
	2004	2005	2006	2007	2008	2009
Bangladesh	-3.2	-3.3	-3.2	-3.2	-4.7	-4.1
Bhutan	1.9	-6.9	-0.8	0.6	-3.2	-2.8
India	-7.5	-6.7	-6.4	-5.4	-6	-6.8
Japan	-4.4	-4.1	-0.9	-2.4	-2.9	-7.6
Korea	-2.3	-2.5	-2.6	0.4	-2	-3.9
Maldives	-1.6	-10.9	-6.8	-7.9	-15.7	-26.1
Nepal	-0.9	-0.8	-1.6	-1.8	-2	-1.9
Pakistan	-2.9	-3.3	-4.3	-4.3	-7.4	-5.2
Srilanka	-7.9	-8.4	-8	-7.7	-6.8	-7
Indonesia	-1.1	-0.5	-1	-1.2	-0.1	-1.6
Malaysia	-4.1	-3.6	-3.3	-3.2	-4.7	-7
Philippines	-3.8	-2.7	-1.1	-0.2	-0.9	-3.9
Singapore	6.9	9	8.2	9.6	5.7	-2.7
Thailand	0.3	0.2	0.1	-1.1	-0.3	-4.8
	Inflation Rate (Annual Average)					
	2004	2005	2006	2007	2008	2009
Bangladesh	5.8	6.5	7.2	7.2	9.9	6.7
Bhutan	3.6	4.8	4.9	5.2	6.4	3.5
India	6.4	4.4	5.4	4.7	8.7	2.5
Japan	0	-0.3	0.3	0	1.4	-1.4
Korea	3.6	2.8	2.2	2.5	4.7	2
Maldives	6.4	3.3	3.5	7.4	12.3	4.5
Nepal	4	4.5	8	6.4	7.7	10
Pakistan	4.6	9.3	7.9	7.8	12	20.8
Srilanka	9	11	10	15.8	22.6	5
Indonesia	6.1	10.5	13.1	6.4	10.3	6.3
Malaysia	1.4	3.1	3.6	2	5.4	1.5
Philippines	6	7.6	6.2	2.8	9.3	4.5
Singapore	1.7	0.5	1	2	6.5	0.5
Thailand	2.8	4.5	4.6	2.3	5.5	0.5

Source: Asian development outlook 2009, 2010, Asian development statistics database and from cabinet office Japan.

Chapter 3

LITERATURE REVIEW

3.1 INTRODUCTION

This chapter will give detailed literature review on inflation, deficit and institutional variables, CBI and financial structure development. The next section will give brief review of different schools of thoughts on inflation determinants; following section will shed light on empirical studies on deficit and inflation relation around the globe. In section 3.4 substantive literatures is reviewed on CBI and inflation relationship. Negativity is confirmed in most of the literature and section 3.5 will give extensive review how financial sector is linked to inflation. Last section will briefly give review of literature on inflation and deficit in Asian economies.

3.2 SCHOOLS OF THOUGHTS

Inflation is attributed to different factors by different schools of thoughts. In this respect brief review of these eminent schools of thoughts is important to glance for keeping eye on the factors that theory proposed as explanation of inflation dynamics.

3.2.1 Classical school of thought:

This school regards inflation as outcome of expansion of money. Quantity theory of money is provided as explanation of inflation by classical economist. Most prominent economist attached to this thought is David Hume, Adam Smith and William Petty. Irving fisher is the first who clearly explain the impact of increase of money stock on inflation, through well known fisher equation. Classical argued that monetary expansion beyond full employment level will always results in increased prices. Main shortcoming of the classical thought is that

proper mechanism is not defined through which money supply will effect inflation. Classical school of thought is one of the oldest doctrines that explained the dynamics of inflation.

Cambridge economist presented another version of classical theory of inflation which is known as neo-classical theory of inflation where they hold increase in demand for money responsible for increase in prices.

3.2.2 Keynesian school of thought:

Classical economists hold money supply as main driving force behind increase in price level. However Keynesian argued that an increase in demand can also raise the prices level due to increase in real factors. When expenditures are in excess to available resources at full employment this there will be inflationary gap as defined by Keynes in his book.¹³ This inflationary gap is evil as it only increases inflation while no change in output. In case of less than full employment, then increase demand not necessarily will result in increase price level but may increase employment as well output.

3.2.3 The Monetarist View on Inflation:

The economist of twentieth century believed that the expansion of money supply responsible for changes in prices and relative prices of the goods determined by the supply and demand of the goods and full employment level generally assumed prevailed in the economy.

Monetarist view of inflation is inspired by quantity theory of money, hold money supply as sole factor that cause inflation. However they did not support the proportionality concept presented by classical. Friedman is the biggest proponents of this thought he regarded inflation

¹³ See How to pay for war (1940)

everywhere is monetary phenomena.¹⁴ He elaborated and clarified the channel how expansion in money supply will affect the price level, through his famous fisher equation,

$$MV=PQ$$

Where M is money stock in particular period is circulation of money which is usually hold as fix and PQ value of goods. So monetarist believes that when there is increase in the money supply it will increase the price level. However they hold view that it is not necessary one to one proportionality exist between the two variable relationships.

3.2.4 Structuralist school of thought:

There is another approach that finds structural rigidities of farm sector especially in developing economies are also source of inflation. They argue that changes in sectoral composition (more rapid development in industrial sector) that would increase the demand of wage good and thus raises the prices of agricultural goods. Increase in raw-material prices and this in turn raises the cost to the industrialist and thus the cycle will end up in raised prices of consumer's goods. (Sen and Vaidya: 1997).

Fiscal Theory of price level

This school of thought holds the policy followed by the government also responsible for increasing trend in inflation. They regarded that when there is persistent increases in the fiscal deficit then government go with the easiest option to finance its deficit, which is monetization of its deficit. In most of the developing states printing of money is easy to do and this lead to excess supply of money that will ultimately end in inflation. Sargent and Wallace (1981) have refined and elaborated the thought and showed how the inter-temporal budget constraint

¹⁴ See Friedman (1963)

impacts the budget of government. Many empirical studies also explored the fact and find evidence of the idea.

3.3 BUDGET DEFICIT AND INFLATION

Literature related to the relationship between deficit and inflation have two contradictory results. Many economists have posed the proposition of no causal relationship between inflation and deficit (see for example, Friedman1981, Blinder1982, Grossman 1982, Hamburger and Zwick 1981, Hein 1981, Sprinkel 1981 and Weintraub (1981). They support there preposition by arguing that inflation results when supply of money grows faster than the supply of goods, which in turn results when federal Reserve purchases too many government bonds. However if Federal Reserve's refuse to monetize money, then budget deficits will not exert inflationary pressure. To support their argument they provided empirical evidence from economy of USA, where there is either weak or not correlation exist between the two. But Miller (1983) showed that inflation do result from deficit policies and criticize other empirical and theoretical studies by saying that they fail to detect any relationship because they were not able to distinguish between deficit policies and deficit realizations.

Macroeconomic theories established that deficit that is financed by seigniorage will end up in inflation. Sargent and Wallace (1981) presented a model in which higher government deficit does not lead to higher taxes rather higher deficit or debt result in higher money growth in current period or in future, and thus lead to inflation. Mode of financing is very important here as different mode of financing are available like seigniorage, borrowing through bond financing or by external borrowing, following identity shows different mode of financing for government¹⁵

¹⁵ Simimi (2000).

Government deficit financing = money creation + internal debt financing + external debt financing.

How deficit will effect inflation it depends on how fiscal deficits are financed. Easterly and Schmidt-Hebbel (1993) argued that money creation is the cause of inflation. Critics also held deficit responsible for crowding out phenomena by affecting the interest rate. When deficit is financed by borrowing then the demand for credit by government increased and less is remain for pvt sector as more credit is required so price of credit goes up. So this replaces the pvt sector investment.

Dornbusch, Sturzenegger and Wolf (1990), asserted that in economies like most of the developing countries, where money creation is the only way to finance government budget deficit, budget deficit becomes a principal determinant of money growth and inflation. The relationship between deficit and other macroeconomic variables hotly debated in develop as well as in developing world. On theoretical ground deficit and inflation link is widely explored by Friedman (1968): Sargent and Wallace (1981); and Miller (1983).

Many empirical studies in different regions of the world support the hypothesis that deficits are inflationary. Economists provide support from panel as well as from country specific data.

In this regard Simimi (2000) investigated two way relationships between deficit and inflation in Iran's economy for the period 1973-1990. He argued that ambiguity in results due to cross-country analysis, so focused should be on individual economy. Used 2sls estimation and simultaneous equation model to analyze the relationship, results confirmed two way casual relationships for Iranian's economy. Study also provides empirical evidence that in developing countries where printing of money is only source of financing, deficits feels to be inflationary. In another study taken by Simimi and jamshidbaygi (2011) focusing on the relationship

between inflation and budget-deficit for Iranian economy based on quarterly data from 1990-2000 also strongly confirmed positive relation between budget deficit and inflation.

Metin (1998) analyzed the relationship between inflation and budget deficit for Turkish economy. Used conditional model for annual data 1949-81 to test the relationship and result confirmed that increased in the scale deficit will immediately increase the inflation. For the same country, Özatay (2000) found the price level has been adjusted to the monetary imbalances caused by the Turkish government's fiscal imbalances. Tekin-Koru and Özmen (2003), on the other hand, confirmed the aforementioned results for Turkey, but used a vector error correction model. Seljuk (2001) estimated seigniorage maximizing level of inflation in turkey and finds that if there is some degree of currency substitution in economy; government cannot collect more seigniorage revenue by simply setting the growth rate of money base at higher level.

Kia (2010) also analyzed different external and internal factors which are responsible for inflation in Turkish economy. By using monetary model of inflation he founded that government debt and deficit are important elements. It is also shown by study that government debt to gdp results in riskier environment and thus leads to high rates of inflation. Case study also indicated that the size of government expenditure leads to increase in prices in short run.

Further evidence between deficit and inflation for African countries established by Chimobi and Igwe (2010) tried to find out relationship between deficit, money and inflation in Nigerian economy. ADF and Phillip-Pepron were used to test stationarity of data. By using VEC model estimates shows that 1 percent point increase in fiscal deficit will lead to increase of 0.94 points in the M2 growth. Granger causality test result indicated that money supply and budget deficit are related to each other. So in Nigerian economy MS determine either there is deficit

or not. Bilateral causality between inflation and budget deficit while unidirectional relation between MS and inflation exists.

It is also asserted by the economist that inflation is also cause of deficit as cited by many. In this respect Onwioduokuokit (1999) examined the casual relationship between inflation dynamics and deficit for period 1970-1994 in the Nigerian economy. Reverse causality from inflation to deficit tested by granger causality test confirmed that deficit were responsible for inflationary pressure in the Nigerian economy but no significance of reverse relationship holds.

For empirical evidence Kilindo (1997) applied Aghevli and khan (1997a, 1997b, 1978) self-generating model to investigate the relationship between deficit, money growth and inflation in Tanzanian economy. Due to reforms in 1984 model was used for two set of data for period 1970-84 and 1985-91. Chow test confirmed structural break in economy. Estimation results by using OLS technique shows strong relationship between fiscal deficit, money growth and inflation in Tanzania. Significant support reported from various studies on the deficit and inflation hypothesis. The on-going relationship explored by Suliman and Ahmed (2011) who explored the long run relationship between money-supply, real GDP and price level for economy of Sudan, using annual data for the period 1960-2005. Granger-causality test applied to investigates short run dynamics and for long run relationship co-integration technique used between GDP, money supply and CPI. Unidirectional relationship founded between GDP and CPI and no causality appeared between GDP and money supply.

Most of the developing countries are prone to many economic illnesses like poverty, unemployment, inflation, low per-capita income, higher population growth dynamics, less developed social and financial infrastructure, high percentage of deficit to gdp and excessive money growth. Less developed financial mechanism is very crucial for developing economies

because it make other modes for financing less efficient like borrowing from financial intermediary institutions and make money creation a least costly option to be adopted by fiscal authorities to finance their deficit. So these all matters how strong will be the relationship between deficit and inflation.

Lozano (2008) empirically tested the relationship between deficit, money growth and inflation by using three different definition of money supply M_0 , M_1 , M_3 . Columbian economy case was studied using VECR model, using quarterly data for the period 1981-2007. Empirical results pinpoint the long run causal relationship between deficit, money growth and inflation. It was argued that if deficit increase by 1 percent there will be 0.46 percent point increase in the M_1 growth rate. Study also holds the point that the casual relationship depends upon degree of independence on the central bank and type of monetary policy regime.

In a cross county study Guess and Koford (1984) used granger casualty test, to see are deficit really cause of inflation or recession in 17 OECD countries for the data-set 1949 to 1981. Results indicated that deficit are not responsible for changes in recession, inflation or crowding out phenomena of pvt investment, however weak link was observed that inflation and recession inflict changes in deficit. So they called deficit a symptom rather than cause of inflation that effect output in any country, so it is argued that deficits are by product of recession and inflation.

To see the variation in inflation and empirically analyze the relationship between fiscal deficit, seigniorage and inflation, another study was conducted by Hisbullah, Cheah, Baharom (2011), who explored the long run relationships between budget deficit, money growth and inflation in thirteen Asian developing countries using annual data for the period 1950-1999, for Indonesia, Malaysia, Philippine, Myanmar, Singapore, Thailand, India, South Korea,

Pakistan, Srilanka, Taiwan, Nepal and Bangladesh. Granger causality test and Error correction model confirmed the long run relationship between deficit, money growth and inflation.

Dejtbamrong (1993) examined the impact of Budget deficit on money-supply and output for the selected sample of SEACEN countries, namely South-Korea, Malaysia, Philippines, Singapore, Srilanka and Thailand. Estimated model based on two-step procedure used by Barrow (1977, 1978), Miskin (1982), Lumas and Macmillin (1984) and Glick and Hutchisian (1990) to measure the real output effects of anticipated and unanticipated measure of fiscal and monetary policy for the period 1974-II to 1989-IV. Empirical estimation results based on reduced form equations of fiscal and monetary policy Showed mix-up results like no effects of fiscal policy on money supply in case of Korea and Philippines and there exist strong relation in case of Srilanka and Singapore. Due to lack of strong capital market structure in Srilanka and Singapore, fiscal variable can affect the foreign inflow of capital that may lead to increase in money supply.

On empirical basis, Protopapadakis and Siegal (1986) extended the literature by empirically estimating relationship between government deficit and money growth, for ten industrialized economies namely Canada, Finland, France, Germany, Holland, Japan, Italy, Switzerland, UK and USA for time period 1974-1983. Rank correlation test used for simple estimation process and excess-money growth and excess debt growth was concerned variables. Results indicated that there is no positive relation between government debt and money growth. It was basically argued that it is financial structure of economy that is responsible for such conclusion

Imported inflation and exchange rate may also be effected by adopted polices as Pologne, Gonzalez and Ford(2008) used Harberger-Hanson Model of QTM to show how much a QTM is efficient in explaining the dynamics of inflation in Caribbean economies including Jamaica, Barbados, Trinidad and Tobago. ARIMA methodology was implied for time period 1973-

2002 and results pointed that in these countries, foreign prices, exchange rate and trade faces the pressure of inflation either due to fiscal or monetary policy regime. In methodology wages and imported inputs were included to capture the specific effect of these in the inflation pressure of Caribbean's economies.

Fischer et al. (2002), using fixed effects in a panel of 94 developing and developed economies, showed that fiscal deficits are main driver of high inflations (defined in excess of 100 percent a year), and estimated that a 1 percentage point improvement (deterioration) in the ratio of the fiscal balance-to-GDP typically leads to a 41/4 percent decline (rise) in inflation, if all else remain constant. However, they also find that changes in budget balances have no significant inflationary effects in low-inflation countries. Several cross-country studies on the determinants of inflation do not take into account fiscal balances in their regressions, assuming that their effects are indirectly captured by other variables (Romer, 1993; Lane, 1997; Campillo and Miron, 1997; Loungani and Swagel, 2001).

King and Plosser's (1985) by using VAR and single equation OLS model for different determinants of inflation for United States and 12 other countries, did not find empirical evidence on the causal relation between deficit, money growth and finally resulting in inflation. Two different studies undertaken by Montiel (1989) and Dornbusch et al. (1990) on high inflation economies using granger causality test and various decomposition of VAR found that fiscal deficit tend to play as accommodating factor rather than derivative factor of inflation. Some other factors like exchange rate and inflationary shocks do affect the relationship between deficit and money growth and inflation. Haan and Zelhorst (1990) using data for 17 developing countries; find that seigniorage weakly related to deficits only in periods of high inflation. Fiscal variables are not affective in playing their role as asserted by

Click (1998) while investigating determinants of seigniorage for cross country analysis of 78 countries.

How much level of development and structural features of any economy matters for a deficit to affect the inflation dynamics, empirical evidence provided by Sahan and Bektasoglu (2010) panel data of seventeen European countries employed for empirical analysis of relationship between inflation and budget deficit. Larsson et al test was applied to test the relationship for turkey and sixteen European countries which include, Czech Republic, Hungary, Poland, Austria, Belgium, Greece, Slovakia, Spain, Sweden, England and time series analysis was used for time period 1990-2008. LLC test, IPS test, Hadri test was employed to test unit-root test at first stage. Larsson test identified co-integration exists between inflation and deficit in case of developing countries, while no long run relationship exists in case of developed nations. Results specifically related to turkey proved that for period 1990-2008, there exist long run relation between inflation and deficit. Study also give indication that generally no long run relation exist between inflation and budget deficit, relationship changes depending on the developmental level and structural feature of economy.

Political instability and political motives also serve as incentive to focus on the short-run objective and the cost of this self interest is generally inflation. Carlstrom and Fuerst (1999) and Carlstrom and Fuerst (2000) presented their view that inflation is the results of policies adopted by the fiscal authorities, so dominance of fiscal authorities is evident in money creation. So the usual relationship between deficit and inflation is fundamental in this respect. One question that is also important is that why deficit persist and does political and institutional setup of the economy has anything to do with deficit, Seigniorage or inflation? Political Economy of Macroeconomic Policy provide literature on two main concepts

"political instability and deficit bias" modeled by Alesina and Tabellini (1990) and "war of attrition" modeled by Alesina and Drazen (1991).

"Political instability and deficit bias" theory pushes the point that alternating governments are not agreed or either ignorant of each other preferences regarding spending or collecting revenues through imposition of taxes. Persuading and favoring their own preferences give rise to excessively high budget deficit in tenure of alternating governments. It is in interest of each government to maximize its own preference order by spending more, and leaving little space for the successor government to spend. The end result of these actions are sub optimal outcome as it cost the welfare of the society. To remain in office and reelected is also the fundamental reason for excessive spending and imposing less taxation, which would result in persistent deficit and eventually leading to the inflation and political instability as Pasten (2000) argued,

"Taxes are politically costly to government both directly and indirectly through their distortionary cost. If the officeholder faces a positive probability of losing power, he or she would prefer to defer taxes to the future while, in the mean time buying political support through increased expenditures that cause a positive trend in the fiscal deficit.....Political instability exists if the incumbent office holder believes that the probability of remaining in office one more period is less than one. It is assumed that the officeholder is a ruling party with uncertain length of tenure because of political uncertainty. Based on these assumptions, a benevolent but politically unstable government places less weight on future welfare than it would under political stability. This causes the fiscal deficit to follow a time series process"

For the study of dynamics of inflation the optimal taxation theory is an eminent concept in theory. But there is failure in finding the empirical evidence. In this regard Edward and Tabellini (1990) empirically worked in finding determinants of inflation, Seigniorage and

fiscal deficits. They tested optimal taxation theory for the group of 21 LDC and all 21 countries results points to the rejection of theory. Political economy approach was used to test macroeconomic issues and results shows political instability and political polarization are the key factors that are responsible for cross-country differences w.r.t inflation, Seigniorage, government borrowing and fiscal deficit.

From above cited literature it become evident that literature tossed the coin and come up with both sides of results regarding correlation between deficits and inflation, so this makes picture regarding relationship a hazy one. To clarify how institutions involvement can improve the relationship coming section will shed light on the importance of CBI and financial markets development in studying the relationship in more detail.

3.4 CENTRAL BANK INDEPENDENCE

Theoretical basis for central bank independence rooted in the concept of dynamic inconsistency of monetary policy under case of discretion Presented by Kydland and Prescott (1977). They explained that there is two way links between policy makers and rational public regarding expectations about inflation and employment. They asserted that monetary policy makers are keener about price stability and employment level and there desired level is higher than natural level. They gave reason that it could be because of distortion created by tax and labor union attitude toward real wages, that to be set above market clearing prices, creates further unemployment. Under discretion policy makers adopt the strategy of inflationary surprise to raise the employment level to desired level, but as consumers are fully aware so they exactly forecast the expectation against inflation. Consumer knows that there will be no impact on employment and monetary policy result in sub-optimal inflationary bias. To reduce this bias Rogoff (1985) and Walsh (1995) presented two theories, which stressed to pass the

authority to central banker who is more conservative toward inflation, than the rest of the society.

Two important Theories for CBI are conservative-central-banker approach of Kenneth Rogoff (1985), and the principal-agent approach of Carl Walsh (1995), Torsten Persson and Guido Tabellini (1993).

CBI concept was first brought under the light by Kenneth Rogoff (1985). His statement was that if more authority will be given to the central bank regarding its pursuance of monetary policy then problem of time inconsistency could be minimized. He argued that head of central bank is relatively more concerned about inflation than output stabilization and thus weights more to inflation than policy makers. This hypothesis empirically supported by successful anti-inflationary policies adopted by the central bank of Germany and Switzerland. Second theory of based on principal agent problem is a contractual agreement where there is penalty on the central bank governor if he fails to control the inflation within optimal level (Walsh 1995)¹⁶. Penalty could be in form of loosing job or also loss of reputation.

It is being asserted that institutional characteristic of central bank have important effects on inflationary outcome. Empirically it is provided that central bank independence and inflation have negative relation in industrial economies (Berger et al; 2000)¹⁷. Measurement of CBI is also important different proxies are being used in literature like provisions contained in central bank laws, or by the turnover rate of central bank governors. The relationship is not supported by the sample of developing countries. Cukierman (1992) who deduced the negative correlation between inflation and CBI fails to conclude such for the sample of developing countries. He hold responsible large gap between effective and legal authority of CBI and thus

¹⁶ This approach implication is founded in New Zealand where central bank governor has contractual agreement with government to target the inflation within limits and on failing that he will lose his job.

¹⁷ Eijffinger et al (1997) de Haan and Kooi (1997) Loungani and sheets (1997) also found negative relation between inflation and CBI in cross-country analysis including developing economies as well.

the measurement indicator used for developed and industrialized nations not appropriate for the developing nations. So, TOR is more suitable for developing nations for measuring central bank independence.

Jacome and Vazquez (2005) explained the independence criteria of central bank and assert political independence is related to the more focused attention toward price stability and restricted interference by the government in appointing and replacing the central bank governors. Central bank is said to be more independent economically if it faces lower responsibilities for banking supervision and higher restrictions to finance the deficits and is more politically independent if governor is for longer period in the office and more dependent if frequent dismissal of governor by the government. Jacome and Vazquez made certain important addition in the CBI index developed by Cukierman et al. (2002), by introducing three different measure of legal CBI and also certain other measures like rules for the appointment of central banks' board of directors, the degree of CBI in the conduct of exchange rate policy, and legal requirements on accountability and transparency.

How to measure CBI? It is important what does the independence really mean in this respect there are two aspect of independence. Grilli, Masciandaro and Tabellini (1991) described them as political independence and economic independence, this influenced by a number of variables like: the election of central bank governor and the members of the board, the term of office, and the statutory objective of price stability as the single objective for monetary policy. Economic independence: represents the overall control of central banks regarding the volume and conditions of government lending. Economic independence also depends on the ability of the central bank to choose and to use the appropriate monetary policy tools, especially the interest rates and the wise supervision of the banking system.

There are two other aspects related to independence recognized by the theory and discussed by DeBelle and Fischer (1994) is instrument independence and goal independence. These two are important in a view that it shows what type of independence figured out in different region of the worlds and especially in developed and developing nations. Goal independence is freedom central bank enjoys in setting its final objectives regarding price stability and output level. Instrument independence is linked to the freedom of central bank using appropriate tools for achieving the final objectives. This is further elaborated by Mishkin (2007) who argued that “goal independence is the ability of the central bank to set its own goals for monetary policy, say a goal of 2 percent inflation rate for two years in the future; instrument independence is the central bank’s ability to independently set monetary policy instruments, for example, the level of the interest rate, to achieve its goals. Central bank should not be goal oriented because its government commitment to legislate mandate to the central bank for price stability when it over ruling, long-run goals. Fischer (1995) argued that certain specified goals and set of goals should be prescribed for CB ,and CB should have power to achieve those goals as well as accountable for its responsibilities.

Tenure of the governor in the office is also used for the measurement of independence and it is required that the governor or the head should remain for long enough in office so that government not able to get time to revise the monetary policy decisions (Dumiter; 2009). In developed world the legal independence is taken as measure for CBI while for developing nations turnover rate of the governor of central bank used as proxy for measuring the CBI (Cukierman, 1996; Eijffinger & De Haan, 1996). However consistency and robustness of relationship for measuring CBI are matter of concern for many economists. Credibility of CB is very important in this respect and which could be achieved if there is high degree of CBI. Monetary economics and literature on central banking have well established facts that

credibility assures central bank commitment to price stability. Credibility is related to the independence of central bank from political or pressure by government in succeeding the monetary policy.

The fiscal dominance has given rise to crucial point in respect of the central bank policy adoption and freely adopting different instrument for its main role, price stability (Sherani; 2006). How importance central bank is in its de-facto and de-jure power in presence of fiscal dominance is crucial to study.

CBI with strong mandate which could restrain inflation and ensures price stability, are very admirable. Support for the view mostly comes from cross-sectional data set but are considerable objections on the CBI. The most common concern is of measurement of CBI, either legal or economics measurements are better. Cukierman argued that legal indices are more appropriate for the developed and industrialized nation, and gave TOR of central bank governor as an alternative measure of CBI which can be used for the developing economies. Greater the TOR the less degree of central bank is judged.

Second concerned is does CBI really matter or not if other variables which also effect inflation are added in the scenario. Campillo and Miron (1997) come up with the results for developing economies, other variables are held constant then CBI plays no role in explaining the inflation dynamics. Sturm and Haan (2001) also established this fact for eighty developing countries for the sample period 1980-89 and then 1990-1998. TOR was used as proxy for the CBI and concluded that once the control variables like political instability, exchange rate regime, and openness added to the model the CBI no longer remain significant.

Although CBI and inflation are reported negatively correlated but certain other factors can alter this correlation like for transition economies this relationship is only found significant in

presence of economic liberalizations. Cukierman et al. (1998) also confirmed this for the 26 post-communist economies by using CBI index based on Cukierman et al. (1992) methodology. Later on Maliszewski (2000) in his paper worked on the legal aspect of the central bank independence and its effect on the inflation for different East European economies and some former Soviet Union countries for time suggest that economic liberalization is pre-condition for significance of the CBI in the sampled economies.

Commonly legal aspect used by most of the literature for CBI especially for industrial states of the globe. In this respect notable studies are of Bade and Parkin (1988), Alesina (1988, 1989), Grilli, Masciandaro and Tabellini (1991), Eijffinger and Schaling (1993), Alesina and Summers (1993). Later on Cukierman (1992) and Cukierman et al. (1992) used turnover rate for developing countries to study the CBI. Cukierman and Webb (1995) and Brumm and Krashevski (2003) also founded significant negative relation between inflation and CBI.

Financial assistance for new and under-developed financial institution is mostly done by the central bank to maintain the financial stability. But the cost of these rescue operation often result in the form of inflation (Maliszewski, 2000).

Economist also focused on the deficit and CBI relationship because economic independence of CB is mainly measure by the restriction to finance the fiscal deficit, so these areas also remain the focal of many economists around the world. Basic motivation behind this concept is that higher degree of independence made bank able to resist against monetizing the deficit and government realizing this that some restriction is there for monetizing the deficit, they will also limit their excessive spending.

Parkin (1987) investigated this for the sample of 12 economies for the period of 1955-83. Some sort of negative correlation exists between CBI and fiscal deficit of government taken as percent of GNP. Result indicated that the countries with highest level of bank independence,

Switzerland, have zero long run equilibrium while economies with lowest degree of independence, France, also have some sort of long run deficit as percentage of GNP. Masciandaro and Tabellini (1988) also look this aspect for the group of economies including, Canada, Australia, New-Zealand, United States and Japan. They concluded that country with lowest level of independence have highest deficit as percent of GDP then others but USA with maximum independency also have same level of deficit as others in group. Once political factors are added, central bank independence no longer remains significant. It is generally augmented statement that monetary authority not discourage government fiscal deficit.

3.5 FINANCIAL SECTOR DEVELOPMENT

There are no doubts that strong and well developed financial sector serves as main financing backbone in any economy, especially developing one. Economic growth and financial sector development have been discussed on theoretical as well as on empirical base in the ample literature. Financial sector development is positively related to the growth (see Schumpeter, 1911; McKinnon, 1973; Shaw, 1973; Levine, 1997; Singh, 2007). The developed economies have significantly developed financial sector, high GDP per capita and moderate growth rates of GDP per capital. While developing countries even after the regulation initiatives are still have less developed financial sector, low GDP per capita and low growth rates as percentage of GDP.

To define the basic idea what is financial sector development? What impact does it cast on the growth? To define in general term what is financial sector, is not easy because financial sector not refer to just certain financial institutions and financial market structure rather it is very intricate system, neither the system itself and nor its operation mechanism could be measure accurately so a single definition will not be appropriate one to tell us what is financial structure or system. Still one can say "a financial system is complex structure which involves

financial markets, financial institutions, financial instruments, rules and regulations, pacts and agreements and norms that facilitates the flow of funds and other financial services within and outside the economy"

Different measures of financial sector developed have been employed in the literature. Most common measures are ratio of liquid financial liabilities to GDP, for instance, the ratio of M2 to GDP, domestic credit to Pvt Sector etc. In line with ongoing debate the negativity is there in correlation between inflation and financial sector development. Inflation is more volatile in economies where average inflation exceeds certain threshold level and in such economies financial sector is as well less developed. While significantly developed financial sector economies have low and acceptable level of inflation. Boyd, Levine, and Smith (1996) are the initiators in investigating the relation between inflation and financial sector development.

Financial market efficiency affects the allocation of savings and investment in the presence of various informational asymmetries. In such circumstances inflation volatility intensifies financial market frictions, obstruct the efficiency of the financial system, and thus hinder long-run growth. If inflation exceeds certain threshold level stable state cannot be reached, financial market friction will be very severe, and finally high volatility is associated with low saving returns.

Government to financed there sustainable deficit heavily rely on inflation taxation and take action to tax financial institutions in the economy. This is solid base in explaining the relation between inflation and financial sector development. Bencivenga and Smith (1993) argued that government should intervene in the economic activity and in financial markets when fiscal or budget deficit exceeds a critical limit. Economic growth is a channel recognized by Boyd, Levine and Smith (1996) which correlates both inflation and financial sector.

Financial sector impacts different aspects of economy, efficient, active as well as developed financial sector will induced more saving and investment and will thus lead to proper allocation and efficient use of saving in different economic projects and thus will responsible in enhancing the growth process. Capital formation is also another aspect that will be improved by the development of the financial sector.

Financial market development is the outcome of two factors that are market forces and an institutional framework which enables efficient distribution of financial resources. Financially developed markets are more efficient in provision of funds to maximize their profits, also able to generate funds through their own resources and operationally will not be contingent on the central bank, as they are more resource sufficient so they offer less inflationary methods to finance deficit. Financial intermediaries are also net lenders so they borrow at variable rates in short-run and lend for longer period at fix rates. In this way if we see that unanticipated inflation it will be harmful to at least part of financial system. Relying on its own resources and profit driven financial sector always support anti-inflationary policies and will develop lobbies and politically motivated strong interest group induced by their incentives, always in favor of independent institutions like independent central bank with prime objective of price stability, as this is the same theme of studies conducted by (Goodman, 1991; Posen, 1993; Al-Marhubi and Willet, 1995).

Financial sector play very crucial and important role in mobilizing saving, capital formation and thus make available resources to be potentially available for investment both human capital as well as for physical structure in the economy. It facilitates the technical progress by reducing the transaction cost, and by providing more capital this would also lead to the development of the technical sector and will enhance productivity. Development of financial sector also important in elevating poverty as it channelize accumulated saving to be invested

in the income accruing sector like investment in human capital like in health and education sector, then small business companies or firms, wider access to the financial services are linked with more employment, increment in income level and thus will lessen the level of poverty, as low income level is one significant factor of being poor (Jalilian & Kirkpatrick, 2002, 2005). If more access is given to financial services it would be beneficial in a way to increase the income level and thus will “up” his economic condition.

A high rate of inflation creates uncertainty and financial market frictions that led to inefficient provision of resources (Huybens and Smith, 1998, 1999; Boyd and Smith, 1998). The empirical literature explores mostly the link between economic growth and financial sector development (Goldsmith, 1969; King and Levine, 1993a, b, c; McKinnon, 1973). Studies conducted by Bagehot (1873), Hicks (1969) Smith and Starr (1995) asserted that financial sector of UK was the major contributor in the industrial revolution. Thus it asserts that financial sector is very crucial for growth process as more liquid financing is provided by them. Bencivenga and Smith (1991) also argued that financial intermediaries are also able to enhance the liquidity and also provide long-term funding for the projects at the same time. Banking and financial markets are also main contributor in this respect but it is mostly said that banking system is more efficient and less dependent on the legal system while markets are more efficient in the more developed legal system.

Relation between the inflation and financial sector development is not as widely cited as economic growth and financial sector development is done empirically. The causality is mostly explored in the way from inflation to financial sector development as by Rousseau and Wachtel (2002), and Lee and Wong (2005) specify that financial development stimulates economic growth only under low or moderate inflation rates. The opposite link could also be investigated empirically.

All literature on central bank independence does not exclude the role of government however some feasible relation and cooperation is required that will mitigate the impact of deficit and will allow monetary authority to set its goals with less interruption from fiscal actor. The cooperation between monetary and fiscal authority is more appropriate to achieve the target than sole independence because this will minimize the loss function faced by both policy makers in setting their goals. Walsh (2011) laid emphasis on cooperation more than non-cooperation between two authorities and asserted that if fiscal authority will not regard price stability as main goal then central bank will not achieve its target even with optimal level of independence. In this way the "free-lunch" delivered by the independence will be curtailed. "Free lunch" concept is presented in the literature regarding independence of central bank, as it lowers inflation but not reduce the output level. This aspect is also observed by many studies and they favor that central bank do provide "free lunch. As mostly in empirical investigation dominantly based on linking CBI to the inflation but will it cast any kind of positive or negative spell on output level as well. Grilli, Masciandaro and Tabellini (1991) however not succeeded to find any effect of the CBI on real output of the economy. Similar concluded by Alesina and Summers (1993) that no influence on the average growth by CBI. However De Long and Summers (1992) found positive impact of CBI on per worker output taking real growth of domestic of output per worker for the sample period 1955-90. But Cukierman, Summers, Kalaitzidakis and Webb (1993) found no such relation exist between growth and CBI even after taking other influential factors (initial GDP level, terms of trade, and initial rate of enrolment of primary and secondary education) in consideration.

3.6 LITERATURE ON ASIAN ECONOMIES

No significant literature has focused Asian economies explicitly in the recent past however now trends are more toward focusing these economies by state economist as well as by

international economists. Most of the studies that investigated the deficit inflation link were mostly panel that have taken Asian economies with other developing nations. Some country specific studies also exist that analyze the relation for their home economies. In this regard Bashir et al (2011) focused on finding important determinants of inflation in Pakistan. For analysis of long run and short run used Johnson co-integration technique and VECM for time-series for the period 1972-2010. For causal relationship granger causality test was used. Results pin point that money supply, GDP, government expenditure and imports are responsible factors for long run increment in CPI. Study further indicated that long run elasticity of price w.r.t money supply, GDP, government expenditure, Government revenues and imports are 0.61, 0.73, 0.32, -1.37, and 0.41 respectively. Causality analysis shows bidirectional as well as unidirectional relationship among few variables.

Chowdary (2004) analyzed the impact of deficit on LDC, mainly on rate of interest, price-level and exchange rate. Five countries of south Asia has been considered and VAR estimation technique was adopted for time-series data. Results showed that deficit does not have significant effect on rate of interest and is not a cause of crowding out phenomena for selected sample countries. While deficit have positive affect in case of India and Pakistan, it reduces prices level in case of Bangladesh and negative relation was found in case of Srilanka and Nepal. Except Nepal deficit have no effect on exchange rate regime for selected sample. As low tax revenue is the main ingredient that fueled deficit as this aspect also explored by Chowdary (2004) where he argued low tax revenues and over expanding amount of deficit is the salient feature of south Asian economies. Low tax revenues are due to narrow tax base, more reliance on the indirect taxes like sale tax, excise and value-added tax, and more dependency on import and export duties.

Hossain (1990) investigated the monetarist and Keynesian approaches of inflation for south Asian economies including Bangladesh, India, Nepal, and Pakistan Srilanka. Monetarist school of thought got supports from the sampled economies. Easterly and Schmidt-Hebbel (1993) in their research explored the impacts of deficits on other macro variables other the inflation for developing economies of Asia. Deficits have significant impact on inflation, interest rate and growth. Asghar *etal* (2011) examined the link between inflation and inflation uncertainty in SAARC regions for three economies Pakistan, India and Srilanka. EGARCH framework employed for the data set 1980q1 to 2009q2. Deducted results suggested that positive shocks to inflation create more uncertainty in the sampled economies. However no explicit study has been conducted for Asian economies to analyze the role of CBI and Financial sector development in explaining the inflationary impact of deficits. So in this regard this study would be serving as motivational force to explore these less touched areas of concern. Some of important studies are presented in appendix.¹⁸

3.7 CONCLUSION

We can conclude, the literature has presented both sides of pictures regarding deficits and inflation relationship. Both arguments in favor and in against do exist as presented by ample literature and some of which cited above, so no clear picture with strong evidence on general ground can be extracted. Thus it is important to look at the different institutional framework and especially the financial and monetary institutions and their role in determining relationship between inflation and deficits. My thesis attempts to fill this gap and intends to find whether deficits are inflationary in presence of independent central banks and developed financial markets.

¹⁸ See table A2 in appendix

Chapter 4

THEORITICAL FRAMEWORK AND ECONOMETRIC METHODOLOGY

4.1 INTRODUCTION

This chapter provides the theoretical and empirical methodology which we are going to use for estimation procedure. In section 4.2 we will discuss in detail the theoretical background developed by Neyapti (2003). Model developed by Neyapti is good illustration of the fact that besides money, financial and monetary institutions are also responsible for inflationary impact of deficits. After theoretical base in next section 4.3 we will develop the empirical model for analysis of research hypothesis. In the last section 4.4 the estimation technique that is to be employed will be briefly discussed, about its basics and assumption why to employ it. Estimation technique which is employed in the study is GMM.

4.2 THEORITICAL FRAMEWORK

Relationship between inflation and deficit has been investigated theoretically in ample literature. Panel as well as individual empirical literature is also available. How financial sector and central bank independence matter for inflation and deficit, theoretical establishment of relation is provided by Neyapti (2003). We are going to follow the theoretical framework of Neyapti (2003) for our analysis of deficit and inflation relationship, in presence of institutional setup and structure.

For analytical framework first the relation between and inflation and deficit is based on inter-temporal budget constraint faced by the government. There is need to establish relation between inflation and money growth. Mostly literature recognized deficit related to inflation

through growth in monetary base (Aghevli and Khan, 1978: Dawyer, 1982: Barnhart and Darrat, 1988: Lozano, 2008: Kia, 2010). Thus money market equilibrium/condition is used for establishing link between inflation and money growth. Later on Neyapti used this relation and inter-temporal budget constraint and taking the assumption that the degree of monetary accommodation dependent on the CBI and FMD. Inflation is expressed as function of present value of deficits where the CBI and FMD are expressed as in interaction variables.

Money market equilibrium condition is stated in terms of liner version of Cagan (1956) money demand function.

$$\frac{M_t}{P_t} = \alpha - \beta \pi_{t+1}^e \quad (4.2.1)$$

Whereas M is money, p is price level, t is time period and α here is representing both real income level and real interest rate, for simplicity both are assumed to be constant to satisfy following

$$\pi_{t+1}^e = E \left(\frac{\pi_{t+1}}{I_t} \right) \quad (4.2.2)$$

$\alpha > \beta > 0$. Neyapti assumed that the expectations are based on rationality $\pi_{t+1}^e = P_{t+1}/P_t$ and it is in equation (4.2.2). Representing the information set available in period t. Equilibrium requires that money supply be equal to money demand in equation (4.2.1) whereas money demand function is negatively related to the expected inflation in time period t. Greater the expectation of inflation in period t+1 smaller will be the real demand for money in time period t.

$$P_t = (\beta/\alpha) P_{t+1}^e + (1/\alpha) M_t \quad (4.2.3)$$

The expectation difference equation for price level is found using equation (4.2.1) and by doing forward substitution for expected price level and taking first difference we get following equation.

$$\Delta P_t = (1/\alpha) \sum_{i=0}^{\infty} (\beta/\alpha)^i E(\Delta M_{t+i}) \quad (4.2.4)$$

Whereas Δ is difference operator and ΔP_t shows the difference between current period and lag period prices, $\Delta P_t = P_t - P_{t+1}$. Here in equation (4.2.4) it is evident that changes in the price level are positively associated to the present value of predictable changes in the money supply.

Deficits are the results of excess spending of government and especially due to non-development expenditure. The government budget constraint requires that revenues should be in significant amount then expenditures and if not so then deficit would be the end results. Government will either borrow from public through bonds or brows from banking sector especially from central bank to finance the deficit. So the money creation will result in increased money supply leading to inflation. Firstly we present the budget constraint of government through which deficit is linked to the money supply in a given period of time.

$$G_t - T_t + rB_{t-1} = def_t = \Delta M_t + \Delta B_t \quad (4.2.5)$$

G represents government expenditures, T is shows tax revenues; B in equation is representing the interest bearing government debt whereas, r, is showing nominal interest rate paid by the government on outstanding debt held by the government. In equation (4.2.5) ΔM shows changes in supply of money while ΔB represents changes in debt. def is used to define the deficit held by the government and deficit here is expenditures of government minus taxes plus interest payment on outstanding debt of government. Through equation (4.2.5) it is pointed that the deficits of government have to be financed either with money creation that is seigniorage or through issuing new debt. These two modes of financing are quite well

established in literature as well leading to different consequences. Sargent and Wallace (1985) established that deficit creates inflation but Easterly and Schmidt-Hebbel (1993) argued that the usual link that deficit are related to inflationary process will depend upon what type of financing is taken up by the government and the link is strong in presence of money creation or financing through seigniorage. In developing economies most financing is done with money creation so this relation is strong enough for such economies. As Dornbusch, Sturzenegger and Wolf (1990) asserted in developing world fiscal deficits are the key determinant of money growth and inflation. Type of financing is important because it make clear either money supply is correlated on one –to-one basis or not with deficit in given period of time.

In the model assumption is made by Neyapti (2003) that in period of time, fraction of deficit is financed by mode of money creation, which is negatively coordinated with CBI and financial market development. So we can write

$$\Delta M_t = \mu(G_t - T_t + rB_{t-1}) = \mu Def_t \quad (4.2.6)$$

Whereas $0 < \mu < 1$ and $\mu = (ICBI \text{ or } IFMD)$. *ICBI* and *IFMD* lack of central bank independence and financial market development and these are calculated on the inverted scale for CBI and FMD indices. Lower value of μ indicates that higher degree of independence enjoyed by central bank, and financial sector is more developed. If μ takes value 0 it means that no money accommodation is done for deficit and central bank is fully independent and financial sector is fully developed so all financing is done by debt issuing. On other hand if μ is 1 then CBI and FMD are at lowers values and all financing is done through money creation mode.

Now if we take expectation on both sides of equation (4.2.6) and then substitute it in equation number (4.2.4) we will get function for inflation which depends upon present value of fiscal deficits. Formation of expectation regarding fiscal deficit all available information is

considered as inflation is expressed in literature dependent on many variables as deficit, money growth, exchange rate as well as structural variables also effect it. Similarly political instability is also eminent factor focused by many studies like Sebastian and Tabellini (1990) Alesina and Drazen (1991) Pasten (2000). Following Neyapti, inflation in this model is expressed as function of its lag value, fiscal deficit, money growth rate and growth rate of real output is also included to capture and control business cycle.

$$\Delta P_t = (1/\alpha) \sum_{i=0}^{\infty} (\beta/\alpha)^i \mu \cdot E(Def_{t+i}) \quad (4.2.7)$$

To see the effects of institutional factors, CBI and FMD are also added to the model. To see how CBI and FMD influence the inflationary effects of budget deficit, deficit is also included as interaction term with institutional variables.

We represent both CBI and FMD by μ , and then interaction term can be written as μDef . μDef is now shows the weighted term which takes value 0 when maximum degree of independence is attached with CB and Financial markets are fully developed, and when μ is 1 it means lowest values attached with CBI and FMD so μDef is deficit itself.

So the general form of inflation function that is presented by Neyapti is following

$$\pi_t = f[A(L)\pi; B(L)Def; C(L)(\mu Def); D(L)gM; E(L)gGDP] \quad (4.2.8)$$

4.3 EMPRICAL MODEL

For empirical estimation procedure, model is established on the base of different existing studies. The specification of the econometric model for inflation is consistent with Neyapti (2003) and Aisen and Veiga (2006).

$$Inf_{it} = \alpha Inf_{i,t-1} + X_{it}\beta + \eta_i + \varepsilon_{i,t} \quad (4.3.1)$$

$i = 1, \dots, N, t = 1, \dots, T_i$

Here inf is inflation level of country i at time period t , α and β are the parameters to be estimated and x is a vector consists of all exogenous variables, η_i is country specific effects and ε is error term.

The model in extended form could be written as

$$Inf_{it} = \alpha_0 Inf_{i,t-1} + \alpha_1 Deficit_{it} + \alpha_2 ExRate_{it} + \alpha_3 Money_{it} + \alpha_4 gGDP_{it} + \alpha_5 TOR_{it} + \alpha_6 FMD_{it} + \varepsilon_{it} \quad (4.3.2)$$

Inf = CPI inflation rate

$Deficit$ = fiscal deficit as percent of GDP

$ExRate$ = Real exchange rate

$gGDP$ = growth rate of real gdp

$Money$ = M2 yearly growth.

TOR = Turnover rate

FMD : Financial Market Development

To see the how deficit indirectly effect inflation through money supply the equation simplified as

$$Inf_{it} = \alpha_0 Inf_{i,t-1} + \alpha_1 Deficit_{it} + \alpha_2 gGDP_{it} + \alpha_3 Money_{it} + \alpha_4 DF + \varepsilon_{it} \quad (4.3.2.a)$$

Here DF is dummy variable included tee see the impact of financial crisis 2008. Now our second objective is to see how CBI and financial sector development involves and describe the relationship between inflation and deficit. Second equation is to include the financial sector determinants and CBI in interactive terms with deficit. So we can write.

$$Inf_{it} = \alpha_0 Inf_{i,t-1} + \alpha_1 Deficit_{it} + \alpha_2 [\mu Deficit]_{it} + \alpha_3 gGDP_{it} + \alpha_4 gMoney_{it} + \varepsilon_{it} \quad (4.3.4)$$

μ shows the lack of CBI or lack of financial sector development, denoted as $lCBI$, or $lFMD$, and $0 < \mu < 1$. If $\mu=0$ it mean maximum independent central bank is and fully developed

financial sector, and if $\mu=1$ it mean lowest degree of independence enjoyed by CB and less developed financial sector is. As in case of developing economies they are resource or revenue deficient and thus Willy or Nilly they have to borrow money through public and thus accumulate debt by paying interest on them or they can monetize it. So in developing economies at least some portion is assumed to be financed by the monetization process so, μ , is representing in the model that part of budget deficit that is financed through money creation for each period and μ here is negatively associated with the degree of CBI as well as financial sector development.

Lack of Financial sector development is introduced with the deficit as interaction term to see how less developed financial sector will affect the dynamics of deficit and then how inflation would finally be effected. DF is financial crisis dummy and DSAsia dummy to capture that in south Asian economies inflation is more dynamic in then East Asian economies.

$$Inf_{it} = \alpha_0 Inf_{i,t-1} + \alpha_1 Deficit_{it} + \alpha_2 (Deficit * FMD)_{it} + \alpha_3 gMoney_{it} + \alpha_4 gGDP_{it} + \alpha_5 DF_{it} + \alpha_6 DSAsia_{it} + \varepsilon_{it} \quad (4.3.4a)$$

Similarly to see how the less independent central bank will have mitigating effect on the inflation as less independent monetary authority will not enjoy more freedom in setting its goals for price stability. Literature recognized more independent central banks have negative impact on inflation. So here turnover rate of central bank governors are used for CBI. CBI is applied here as interaction term with deficit, higher turnover rate shows that political interference is more and central bank is not independent in following its targets.

$$Inf_{it} = \alpha_0 Inf_{i,t-1} + \alpha_1 Deficit_{it} + \alpha_2 (Deficit * TOR)_{it} + \alpha_3 gGDP_{it} + \alpha_4 gMoney_{it} + \alpha_5 DF_{it} + \alpha_6 DSAsia_{it} + \varepsilon_{it} \quad (4.3.4b)$$

So final equation that is to be estimated with both CBI and financial sector development interactive term is

$$Inf_{it} = \alpha_0 Inf_{i,t-1} + \alpha_1 Deficit_{it} + \alpha_2 (Deficit * TOR)_{it} + \alpha_3 (Deficit * FMD)_{it} + \alpha_4 gGDP_{it} + \alpha_5 Money_{it} + \alpha_5 DF_{it} + \alpha_6 DSAsia_{it} + \varepsilon_{it} \quad (4.3.4c)$$

4.4 ECONOMETRIC TECHNIQUE

Following section will discuss econometric technique that will be utilized in the study. We will discuss the two techniques of GMM proposed by Arellano and Bond (1991) and Blundel and Bond (1998).

4.4.1 Panel Unit Root Tests

Unit root was applied to check the stationarity of the series. Fisher and panel LLC test applied to all series to check there stationarity conditions. This test was initially proposed by Levin and Lin (1992, 1993) and later Levin, Lin and Chu (2002). The null hypothesis formulated as

H0= Each time series contains unit root

H1= Each time series is stationary

However this unit root test is based on certain kind of assumptions. Like cross-sections should be independent and if there is some type of correlation then test would not be applied.

4.4.2 Generalized Methods of Moments

In our model basic equation is

$$Inf_{it} = \alpha Inf_{i,t-1} + \beta X_{it} + \varepsilon_{i,t} \quad (4.4.2.1)$$

$i = 1, \dots, N, t = 1, \dots, T_i$

So inf_{t-1} is taken as there is persistency in many time-series variables and model specific equation is of dynamic nature. Lag of dependent variable is included in the model as regressor

to control for persistence in inflation and also to analysis the impact of previous period inflation on current period inflation. Traditional OLS technique for estimation will produce inconsistent and biased results due to dynamic specification (Green, 2003:221). Endogeneity may also present in the model due to explanatory variables. Instrumental variables used to refine these problems and to get efficient estimates. IVLS, 2SLS/3SLS and GMM are proposed techniques by literature for resolving the problems of dynamic models.

GMM is most appropriate for dynamic panel data as used in many empirical studies (Das and Paul: 2011, Presbitero: 2006, Bhaskara *etal*: 2009). Panel data combine both cross-section and time series so it allow us to see inflation and deficit over long period of time of different Asian economies panel data some time employed to detect those dynamics that cannot be detected in cross-section data. A country-specific effect which occurs in panel can be controlled and tackled using suitable and appropriate GMM techniques. Sample period is quite large and possibility is there that variables used for estimation procedure may be non-stationary. If dependent variable is non-stationary then GMM will not be appropriate techniques, so we check non-stationary of variables with available panel unit-root tests.

Arellano and Bond introduced the concept of difference GMM in 1991 to tackle the various problems raised in the estimation of dynamic panel model. Possible problems that are suspected in dynamic panel are

1. Endogeneity could emerge, due to presence of endogenous variable. Deficits and money supply, as causality may run from both directions, so in presence of Endogeneity usual OLS technique will fail and give biased and inconsistent estimates.
2. There may present country specific time invariant effects (fix effects), such as demographics and geography which may be correlated with regressor, fix effects are

often part of error term in equation one, which contain both unobserved country specific effects η_i , and observation specific effects e_{it} , $\varepsilon_{it} = \eta_i + e_{it}$.

3. Lag dependent variable, $\text{Inf}_{i,t-1}$, as regressor present in model that give rise to autocorrelation.

To tackle these problems 2 stage least square method could be applied but level variables are used as instruments which may rise the problem of weak instruments so Arellano and Bond (1991) GMM is more appropriate which not only uses exogenous variables but also lag levels of endogenous variables as instruments. So now endogenous variables become predetermined variables no more correlated with error term in above equation. To cope with second problem GMM uses first difference so the our equations takes the form

$$\Delta \text{Inf}_{it} = \alpha \Delta \text{Inf}_{i,t-1} + \Delta \beta X_{it} + \Delta \varepsilon_{it} \quad (4.4.2.2)$$

Country specific effects removed after taking first difference of the regressor because it is no more correlated to time. As now

$$\Delta \varepsilon_{it} = \Delta \eta_i + \Delta e_{it} \quad (4.4.2.3)$$

$$\varepsilon_{it} - \varepsilon_{i,t-1} = (\eta_i - \eta_i) + (e_{it} - e_{i,t-1}) = e_{it} - e_{i,t-1} \quad (4.4.2.4)$$

To tackle with third problem the further lags of the dependent variables are used. The lag dependent variables will be less or insignificant with error terms as T will increases.

However the weak instrument still remain an issue and lag levels can be poor instruments of first difference regressor. So to tackle this system GMM proposed by Blundell and Bond in 1998. Who gave arguments that weak instruments may still produce biased results and suggest extra conditions to be used with lag level of regressor as instruments along with lag levels of regressor in difference equation.

Chapter 5

DATA AND VARIABLE CONSTRUCTION

5.1 INTRODUCTION

The main focus of this chapter is to present different variables used in the estimation process and their constructions, definitions and sources from where they have been collected. Study hereby utilizes the panel dataset from 1981-2010 for eleven Asian economies. The study did not go beyond the starting period because of limitation and non-availability of data for some variables. Furthermore in 80s financial sector reform commenced in most of the south Asian economies, which serve a reason for selection of data from 1980s. The next section will elaborate the construction and sources of different variables used in the estimation process in detail.

5.2 CONSTRUCTION OF VARAIBLES

Neyapti (2003), Aisen and Veiga (2007) are the two important studies which are considered in using the variables for estimation process. Following Neyapti (2003) seven variables are used in the estimation process. These include inflation, deficit, money supply, real GDP, real exchange rate, CBI, and financial market development, etc. Each variable is now discussed in detail regarding its definition and construction.

5.2.1 INFLATION

Being the economic and social issue inflation is enormously used and estimated in different empirical studies undertaken by many economists around the world (Aghevli and Khan1977, king and Plosser: 1985, Edwards: 1990, Seljuk: 2001, Catao and Terrones: 2005, Aisen and

Veiga: 2007, Lozano: 2008). Following Neyapti (2003) and Cukierman (1992), inflation is used here, to see how much it is influenced by the deficit in the budget. "Annual average rate of change in consumer prices" is taken as measure of inflation in the study from WDI. Annual series is used here for all eleven Asian economies from 1981-2010.

Inflation has large variation in time series as well as in cross-section data. This variation may cause data and estimation biases and may produce insignificant and spurious results thus leads to wrong conclusion. Thus to reduce the possibility of heteroskedasticity of error term and to increase the efficiency of estimates following Cukierman(1992) a new variable "D" introduced which is transformed form of inflation and is defined as

$$D = \frac{\pi}{1 + \pi}$$

Where "D" is the depreciation rate of money stock and π is inflation rate. So we transformed each year's inflation into inflation, divided by one plus inflation for each country. Now the "D", transformed inflation rate, will take value 0-1.0. This will reduce heteroskedasticity and will produce more efficient results then that would result from straight use of inflation Cukierman (1992).

5.2.2 BUDGET DEFICITS

Deficit used in many studies for examining its impacts on various economic variables like inflation, interest-rates etc. Deficit defined according to the methodology and implication of variable used in estimation procedure. Deficit is crucial for many developing economies and raising fiscal deficit to gdp makes is consistent pain for many south Asian economies and especially in the selected region for the study. It is considered as root-cause of inflation in

many studies (Sargent and Wallace: 1981, Miller: 1983, Catao and Terrones: 2005). Deficit to gdp has increased over many decades.

Mostly primary deficit is used in most of the studies. Primary deficit is the difference between revenues and expenditure of the fiscal authority. Primary deficit plus inclusion of interest payment of government is known as overall deficit. In the study undertaken here overall deficit is used for estimation procedure. Overall deficit or fiscal balance defined as “difference between total revenue and total expenditure. When the difference is positive, then the fiscal position is in surplus, otherwise, it is in deficit”. Total expenditure includes current and capital account and current account includes goods and services provided by the central government and also payment of interest on public debt. Here deficit is defined according to central government revenues and expenditure and deficit as percentage of GDP taken from IFS.

5.2.3 RATE OF GROWTH OF M2

Different measure of money supply has been employed to see the impact of deficit on the money supply and how both are connected (Hsiao (1981, 1982) and Sims (1980). Barnhart and Darrat: 1988). M1 and M2 are most commonly used measures of money supply used in empirical analysis (Dwyer: 1982, Park: 2006). Instead of taking growth rate of base money (currency in hands plus cash reserves held at central bank), growth rate of M2 is taken as measure of growth of money supply growth rate are calculated for each country on annual basis.

M2 is a broader category, then reserve or base money (Mo) and it is widely and commonly used definition in literature as well as it is very convenient and readily accepted for payment of goods and services. It may include minimal interest payment and some foreign currency

used for domestic transaction purposes. So the proper definition of M2 implied for estimation purpose is taken from WDI is

“Money and quasi money comprise the sum of currency outside banks, demand deposits other than those of the central government, and the time, savings, and foreign currency deposits of resident sectors other than the central government.”

5.2.4 RATE OF GROWTH OF REAL GDP

This variable is taken into account for estimation purpose following Neyapti (2003) as to capture how changes in output effect the inflation or price level. Real gdp is used by economist to see the growth of economy, whether it is shrinking or stretching in size and how it will effect macroeconomic variables. Data for sample countries is taken from World economic outlook.

5.2.5 FINANCIAL SECTOR DEVELOPMENT

Several indicators are used to measure financial sector development in various studies. Financial sector is very important for any economy. Financial sector liabilities, private sector debt to gdp and M2/GDP are some of the indicators most commonly used in ample literature. Two indicators that are used here are

1. Private sector credit to gdp
2. Bank deposits

5.2.5.1. Private sector credit to GDP

Private sector credit is used in study to measure financial sector development in the selected sample economies. Many studies used this indicator to find the impact of financial sector development on the inflation dynamics. Development of financial sector will provide economy with more efficient intermediation system reducing information and transaction cost involved in process of intermediation process. This indicator is used in two different forms in literature, Pvt Sector credit as percentage of GDP and Pvt Sector credit in total. Both of these variables are used to measure the efficiency in provision of credit to the Pvt Sector. More provision of credit to private sector shows less dependency of state/fiscal authority on monetary or financial institution, as more involvement of Pvt Sector will provide and make possible more availability of credit to the fiscal authority. For estimation procedure Pvt Sector credit in percentage of GDP is used for selected sample as applied by King and Levine (1992), Boyd, Levin and Smith (1996). Data is extracted from World Development Indicators (WDI). We will employ variable in absence form, this means that we want to see what will impact of deficits on inflation when financial markets are less developed, for this we have to convert them as well. For easy interpretation of the variables the institutional variable used in the study (Pvt Sector credit, bank deposit, and Central bank independence), before multiplying these with deficit, each variable was normalized between 0 and 1 on inverted scale following Neyapti (2003). So each variable when takes the value 1 its mean complete lack of CBI or FMD (it means that either $CBI=0$, or $FMD=0$, so then $LCBI=1$ or $LFMD=1$). The normalization process is as follows.

To normalize, Pvt Sector credit, between 0 and 1, each value of the variable is divided by the maximum value it takes in the whole sample. To invert the scale, such that one means complete lack of financial development, subtract the resulting variable from 1. Further

dividing the resultant series from its maximum value to make the minimum value of the initial series equal to one, so to get value equals to 1 that's shows complete lack of financial sector development. So normalization and inversion process be

$$FMD = [1 - (FMD_i/FMD_{max})]/[1 - (FMD_i/FMD_{max})]_{max}$$

5.2.5.2 Bank deposits

This indicator is used in literature to determine the depth and degree of the financial sector development. Many studies also used this measure (King and Levine: 1993, Beck and Kunt: 2009) and others. The rationale behind using this indicator is to see degree of financial sector development for Asian economies and how deficit is affected by low financial sector development. It is measure as ratio of deposit money bank domestic asset to deposit money bank domestic asset plus central bank domestic assets. Banking sector is more efficient in provision of services than the central bank. This variable is referred as, *BANK*, by King and Levine, so higher values corresponds to more financial services provided by the banks and thus higher levels of financial development. This variable also used as interactive term with the deficit and thus for easier interpretation firstly it is normalized as the above financial variable. This variable has been taken from database of World Bank constructed by Beck *etal* (2009)

5.2.6 Central Bank Independence

To measure independence of central bank different measures adopted in empirical studies. Legal and political independence of central bank is mostly focused by literature. Economically more independent central bank will be more restrictive in monetizing fiscal deficit and political independence assure less involvement of government in appointment and dismissal of governor of central banks. Here to measure independence of central bank Turnover rate of

central bank governors, TOR, is used as proxy of political measurement of independence of central bank. Turnover rate is used in many studies like Cukierman (1992), De Haan and Kooi (2000). More TOR mean less freedom monetary policy enjoys in following its targets, it face severe pressure of fiscal dominance and frequent dismissal of governors can be observed. Turnover rate data is extracted from index calculated by Sturm, Jan-Egbert and Jakob de Haan (2001).

5.2.7 Real Exchange rate:

This variable also employed to see the impact of exchange rate fluctuations on the inflation dynamics in the selected Asian economies. This is defined as a unit of domestic currency relative to U.S dollar, means higher value is associated to real exchange rate depreciation and vice versa. It is calculated following the procedure of Rodrik (2008) using the data of Penn world tables 7.0 for nominal exchange rate, XRAT, and PPP conversion factors (PPP).So real exchange rate calculated as

$$LRER_{it} = L(XRAT_{it}/PPP_{it}) \quad (5.2.7.1)$$

where i is a country index and t is time periods; XRAT and PPP are taken as in national currency units per U.S. dollar; L point out that the variable is in logs. Table format for description and sources of data is given in appendix.¹⁹

¹⁹ See table A3.

Chapter 6

RESULTS AND INTERPRETATIONS

6.1 INTRODUCTION

This chapter will give detail insight about results and their interpretation. Next section, 6.2, will show the unit root test to check stationary of data. It has two sub sections which provide complete detail of four models estimated in the study. First section, will give detail of first two models that how deficit, money supply and inflation are linked. Second gives result and interpretation of how lack of financial sector development and dependent central bank will have impact on deficit and they linked to inflation dynamics in the sample Asian economies.

6.2 UNIT-ROOT TEST RESULTS

The models are dynamic in nature and time period is large enough that require testing of unit root for the sample variables as many have time trends, like inflation and gdp. So series and variables that are non-stationary may produce spurious results. Different unit root test available for panel data set that helps, testing the stationarity of data. IPS, LLC, Hadri and Fisher are the most common one used in the empirical studies. Fisher test, LLC test and IPS test are employed in the study to check the stationarity of the variables. Maddala and Wu (1999) and Choi (2001) proposed Fisher test to check unit root in the panel.

$$p = -2 \sum_{i=1}^N \ln p_i$$

This combines p-values from unit root test for each cross-section i to test the presence of unit root in panel data. This follows χ^2 distribution with 2 degree of freedom. The main advantage

of this test is that it does not required balanced panel data set and applied to individual series with flexibility in selecting different lag lengths. Table 5.1 shows results of unit root tests.

TABLE 6.1
Results of stationarity

Variables	LLC test statistics	Fisher test statistics	IPS test statistics
Inflation	-9.5818	228.6462*	-3.9634
Deficit	-8.3345	107.7259*	-2.3939
Rgdpg	-9.6133	227.0069*	-3.7025
M2	-8.4011	224.9251*	-3.7818
Pvt credit	-11.6752	116.2301*	3.9134
Bank deposits	-8.3413	117.4302 *	-2.2951
Turnover rate	-8.3369	572.9248*	-2.2141
Exchange rate	-6.3750	64.2643*	-2.0023

Note: 1) Null hypothesis all panels contain unit root. 2) * indicates significance is at 1% level.

Table 6.1 results of unit-root check by all three tests shows that null hypothesis is rejected at 5 % level of significance and no unit root exist in all the variables used in the study. So now we can proceed with the estimation results obtained by the System GMM technique.

6.2 DISSCUSION OF RESULTS AND EMPRICAL FINDINGDS

Basic panel techniques fixed and random effect models were applied to the empirical model in first stance. If we look at results of fixed effect model,²⁰ it become clear that some of the concerned variables are insignificant like bank-deposits used as interactive term with deficits and some have negative signs, while random effect model improves the results like CBI now become significant but some variables are still not significant and negative sign of fiscal deficits also seems critical. This shows that the suspected problems of endogeneity, due to presence of deficit as independent variable in the model, and problem of serial correlation due to presence of lag dependent variable is quite serious that have given suspicious results with the basic Fixed and Random approach for panel data set. So the model estimated with the

²⁰ See appendix table A4

GMM technique that handle both problems endogeneity and autocorrelation between error terms due to presence of lag dependent variable.(Roodman:2006).

Table 6.2
Summary statistics

Variables	Obs	Mean	Std.dev	Min	Max
Inflation	330	0.722085	0.784563	-8.9679	3.88418
Deficits	330	3.398458	3.425382	-16.652	4.84354
Growth of M2	330	2.541406	0.800742	-1.4716	4.27544
R. exchange Rate	330	0.728276	0.389814	-0.53635	1.58477
Real GDP Growth rate	330	4.936431	3.26972	-13.1267	13.2881
Pvt Sector Credit to GDP	330	55.43072	50.56078	6.96069	227.753
Bank deposits	330	88.89923	11.81779	43.9535	99.9978
TOR	330	0.245454	0.068755	0.133333	0.36666

Table 6.2 gives the summary statistics of all variables used in the estimation procedure of all economies in selected sample. Sample period was 1981-2010. There are eleven countries; six south Asian, four south East Asian and one East Asian country. Both Asian regions suffered from major financial crisis of 2008. Fiscal deficits and inflation remains the main critical issues of these economies, particularly for south Asian economies.²¹ Annual average rate of change in CPI is the dependent variable, and all other are explanatory variables. Deficit as percentage of GDP is used to measure fiscal imbalances. -16 is maximum deficit because it is showing the difference between expenditure and revenues, and negative is showing the deficit part while maximum is 4.8 is surplus. TOR, which is used as proxy for measuring the central bank independence is also important to discuss here, it's actually Turnover rate of Central

²¹ Pakistan, India, Bangladesh, Nepal, Srilanka, Malaysia, Korea, Indonesia, Philippines, Thailand, Japan.

bank governors, as Cukierman (1992) specified that a standard is 0.26, above which shows less independence of central bank. In our sample average is 0.24 which is not extreme but near to standard so one careful statement could be that on average in sample Asian economies do face political pressure and are not free in following their policy objectives. Table 6.3 gives details of correlation between different variables. As evident from the correlation matrix problem of multi-collinearity between variables is not serious.

TABLE 6.3
Correlation Matrix of All variables

Variables	Inflation	Deficit to GDP	Money growth (M2)	Rgdpg	R. exchange rate	Bank deposits	Pvt sector credit	TOR
Inflation	1.0000							
Deficit to GDP	0.0712	1.0000						
Money growth	0.3186	0.0399	1.0000					
Rgdpg	0.1458	0.2281	0.1747	1.0000				
R.Exchange rate	0.2898	0.1333	0.3014	0.0837	1.0000			
Bank deposits	0.0798	0.4871	0.1046	0.0895	-0.3575	1.0000		
Pvt sector credit	0.1842	0.1583	0.4081	0.1969	0.0396	0.4448	1.0000	
TOR	0.0424	0.0877	0.0519	0.1127	0.0327	0.0284	0.0139	1.0000

TABLE 6.4**The GMM Estimates: Dependent variable (Inflation growth rate)**

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Inflation(-1)	0.5168 * (8.43)	0.3791* (5.19)	0.4989* (7.45)	0.3774* (7.33)	0.3864* (6.19)
B.deficit	0.0238 *** (1.88)	0.0234 ** (2.06)	-0.0320 (-1.00)	-0.1631** (-2.86)	-0.2899* (-3.70)
Rgdpg	0.0202 (0.93)	0.0096 (0.45)	0.0159 (0.40)	0.0093 (0.47)	0.0118 (0.60)
Real exchange	0.4475 ** (2.79)	0.3035** (2.96)	0.5802* (4.37)	0.0474 (1.70)	0.0794** (2.92)
Money growth		0.2258** (2.05)	0.0711*** (1.74)	0.0779 *** (1.75)	0.0824** (1.99)
Deficit*PVT				0.0485** (3.09)	0.0660* (4.18)
Deficit*bank-deposit				0.0214** (2.04)	0.0342*** (1.86)
Deficit*TOR			0.2614** (2.08)		0.2634*** (1.76)
Constant	0.1211 (1.05)	0.3449 (-1.29)	-0.2774 (-1.23)	0.1198** (2.25)	0.2231*** (1.76)
South Asia dummy	0.1563*** (1.77)	0.1914*** (1.82)	0.2762** (2.06)	0.2848** (2.42)	0.1914*** (1.82)
Financial crisis 2007-08 dummy	0.3536 *** (1.75)	0.3721*** (1.71)	0.3801*** (1.84)	0.3786*** (1.91)	0.3026** (2.53)
Sargan test P-value	0.260	0.374	0.349	0.303	0.298
F-test	246.64 0.000	373.16 0.000	497.43 0.000	524.62 0.000	574.26 0.000
AR(1) P-value	0.155	0.127	0.145	0.148	0.153
AR(2) p-value	0.338	0.283	0.314	0.285	0.294
Observations	297	297	319	297	308

NOTES: all value in parenthesis denotes t-stat. *, **, *** shows level of significant at 1, 5 and 10 % respectively. Panel regression, 1981-2010, estimated by GMM.

MODEL 1

In table 1 First model shows the results of first objective, whether there exist any relationship between inflation and deficit as explored by many empirical studies (Niskanen 1978; Aghevli and Khan 1978; Hamburger and Zwick 1981; Metin 1998; Catao and Terron 2003; Hisbullah, Cheah, and Baharom 2011). The lag impact of inflation on current inflation period is significant with the value 0.517 shows that inflation is dynamic phenomena and pervious level of inflation do effect the behavior of individuals in the current period. As asserted in many existing studies that inflation has persistent component. Deficits are statistically significant and explain variations in inflation. Many studies done in Asian economies presented inconclusive results on relationship between inflation and deficits but some individual country specific and cross country analysis however supported the FTPL and Sargent and Wallace hypothesis ,which emphasis that developing economies running sustainable and persistent deficit will ultimately ended in higher price levels. Deficits coefficient 0.024 shows that if there is 1 unit increase in the deficit, price level will raise by 0.02 units ,shows positive association of fiscal deficits with inflation for sample Asian economies. This result goes with facts and data as significant Asian economies have persistent and sustained fiscal deficit, like Pakistan, Srilanka. In first model business cycle fluctuation effect on price level also captured by taking growth rate of real gdp as a proxy. Coefficient shows positive impact but it is insignificant. Exchange rate is also important in analyzing the dynamics of the inflation and the coefficient here is positive and significant throughout all models. It reveals the fact that exchange rate fluctuations also impact the policies adopted by the monetary authority (Mishkin; 2008). This result gives one interesting insight that exchange rate and inflation will be linked or pass-through impact will be strong under unstable monetary policy environment. But stable monetary policy--- under such a institutional setup that allow central bank to pursue its objectives without interference and pressure of fiscal authority---effectively minimize the

potential source of pass-through of exchange rate to domestic prices (Taylor; 2002, Mishkin; 2007). This result indicates that in sample economies unstable monetary environment prevails and exchange rate fluctuations exerts pressure on price level. The difference between two regions is captured by including a dummy which take value 1 for South Asian countries and zero for South East Asian countries and results indicate a significant difference with expected positive sign for most of the models indicating that the South Asian countries are more inflationary. Deficit will be more crucially linked to the inflation is these economies includes, Pakistan, India, Srilanka, Bangladesh and Nepal. In these economies political pressure plays important role in extensive public expenditure, whereas on other hand tax revenue rate is quite low due to structural and administrative issue. So in south Asia fiscal deficit remain higher through decades comparative to the south East Asian economies. Political and institutional factors are also important for high deficits in these economies. Low transparency and high corruption rates also increases the fret of these economies. India however have improved its transparency and corruption index while Pakistan performance has worsen over the time on the scale of transparency, accountability and corruption in the public sector on a scale of 1 (low) to 6 (high) [World development Indicators (2010)].

The deficit to gdp ratio however in the recent decade show some decline but it remains higher in overall Asian economies as compared to developed nations. Pakistan deficit to GDP ratio was averaged on 7% during 1981-1990, 5% during 1991-2000 and it was average 4% during 2001-2010. In India deficit to GDP ratio was averaged on 8% during 1981-1990, 5% during 1991-2000 and it was average 0.04 during 2001-2010. Sri Lanka deficit to GDP ratio was averaged 8% during 1991-2000 and it was average 8% during 2001-2010. However the average deficit to GDP from 1981-1990 and 2001-2010 for South East Asian economies remain between 1-5 % which is lower than south Asian economies. Asian economies have face different crisis like East Asian economies faced 1997 crisis, then in decade of 2000 food

price hikes and severe financial crisis intensified the inflation and deficit debt ratio. To capture the impact of financial crisis of 2007-08 dummy variable also added to model. Results of the first and other estimated models show that it is significant and it becomes evident that financial crisis also intensified inflation in Asian economies. Sargen test, used for the validity of the instruments employed in the estimation process of GMM; in the model shows that all instruments used to reduce the problem of suspected endogeneity and serial correlation are valid. All exogenous variables and higher lags of the dependent and independent variables are used as instruments. The F-test for the overall significance of the regression and the Arellano-Bond tests AR (1) AR (2) for serial correlation, supporting the model specification.

MODEL 2

The coefficient of lag inflation is significant and positive in the second model which is in line with the study of Neyapti (2003). Money supply is the key through which the deficit is linked to the inflation as explored by many empirical studies like (Catao and Terrons; 2005), and also monetarist school of thought present money supply as main cause of inflation. The results of second model show that inertial factor of inflation is strong and coefficient of deficit which is still positive here but it is more significant in the presence of money growth with t-stat 2.06, so money growth has improved the significance of deficit and inflation relationship. Money growth M2 is also statistically significant for the sample economies. The results are in-line with studies of Levy (1981), Hamburger et al. (1981, 1982), Dewald (1982), Dwyer (1982), Haan and Zelhorst (1990) Fischer et al. (2002).

Results of model 2 signify the fact that money creation is the noteworthy mean of deficit financing. Generally there are considerable ambiguities between inflation and government budget deficit across developing countries due to different methods of financing deficits as well as macroeconomic performance of each country. Here the money growth of M2 is taken

to see the impact of deficit on inflation. M2 is composed of Average annual growth rate in money and quasi money. Money and quasi money comprise the sum of currency outside banks, demand deposits other than those of the central government, and the time, savings, and foreign currency deposits of resident sectors other than the central government.²² Dummy variables are also significant and statistical properties of the model specification are also satisfied.

Model 3

First two estimated models of table 1 show results of primary objective are deficits inflationary or not? Estimated results of basic objective reveals the fact that in sample Asian economies there do exist some kind of correlation between deficit and inflation supported by many country specific and cross-sectional studies. However money supply is held responsible for inflation growth but there may be some institutional and structural aspects also responsible for the link of deficit to inflation besides the traditional approach that captivate money supply. Neyapti (2003) provided some explorative basis to see other institutional structure of the economy that may also be responsible for deficit inflation relation; two key institutional factors are of great worth, central bank independence and role of financial markets. Second objective of this research work is to see how these two factors play role in enhancing the inflation dynamic in presence of deficit. Central bank is the key institutions that are responsible for price stability in the economy. More independent central bank recognized by the theory as more keen and subjective toward targeting the price stability motive (Rogoff; 1985). Reserve central banker is keener in maintaining stable price level and smooth working of economy than the rest of the society and political agents. But the main concern is that in many economies around glob, independence is not enjoyed in respect of focusing on target and free pursuance of motives. Ample literature has empirically investigated that the more

²² Defined by International Monetary Fund's (IMF), International Financial Statistics (IFS).

independent central bank negatively related to the inflation (Berger et al., 2000). Different measures involved to measure the central bank independence like different indexes,²³ and TOR of governors. TOR of governors considered most appropriate measure of independence of central bank (Cukierman et al: 1992). This research study incorporated the TOR index calculated by Dreher, Sturm and Haan (2007). The period for analysis is 1981-2010 and Asian economies selected based on the data availability for TOR and rest of the variables. As no specific studies have empirically examined the Asian economies with these two financial institutions so this study will explore this aspect in the next models of the table 1.

TOR is used as interactive term with deficit to see how it play role in explaining the inflationary impact of deficit. The coefficient of TOR*deficit is positive with value 0.26 and it is also statistically significant with t-value 2.08. Results reveal the fact that higher coefficient of TOR shows that Central bank is not enjoying the independence in its real sense. As TOR is political measure of central bank independence, it signifies that political pressure is greater in sampled Asian economies, and there is frequent dismissal of governors with the change in government, which shows that political agents are very much influential in business of the central bank. Deficit to gdp variable in model 3 after inclusion of central bank measures, TOR, now change sign and become negative however it is insignificant. It shows that deficit have more stronger positive impact on the inflation when central bank is not independent from political pressure, as measured in this study. Data shows central bank in south Asia is more under political pressure in persuading its targets. However east and south east Asian economies are not exceptional but have far better scenario than south. Figure are shows the same fact.

²³ CWN index, GMT index etc.

Figure 6.1
Governor's TOR and average inflation over the period 1981-2010 in
Sample Economies (scatter plot)

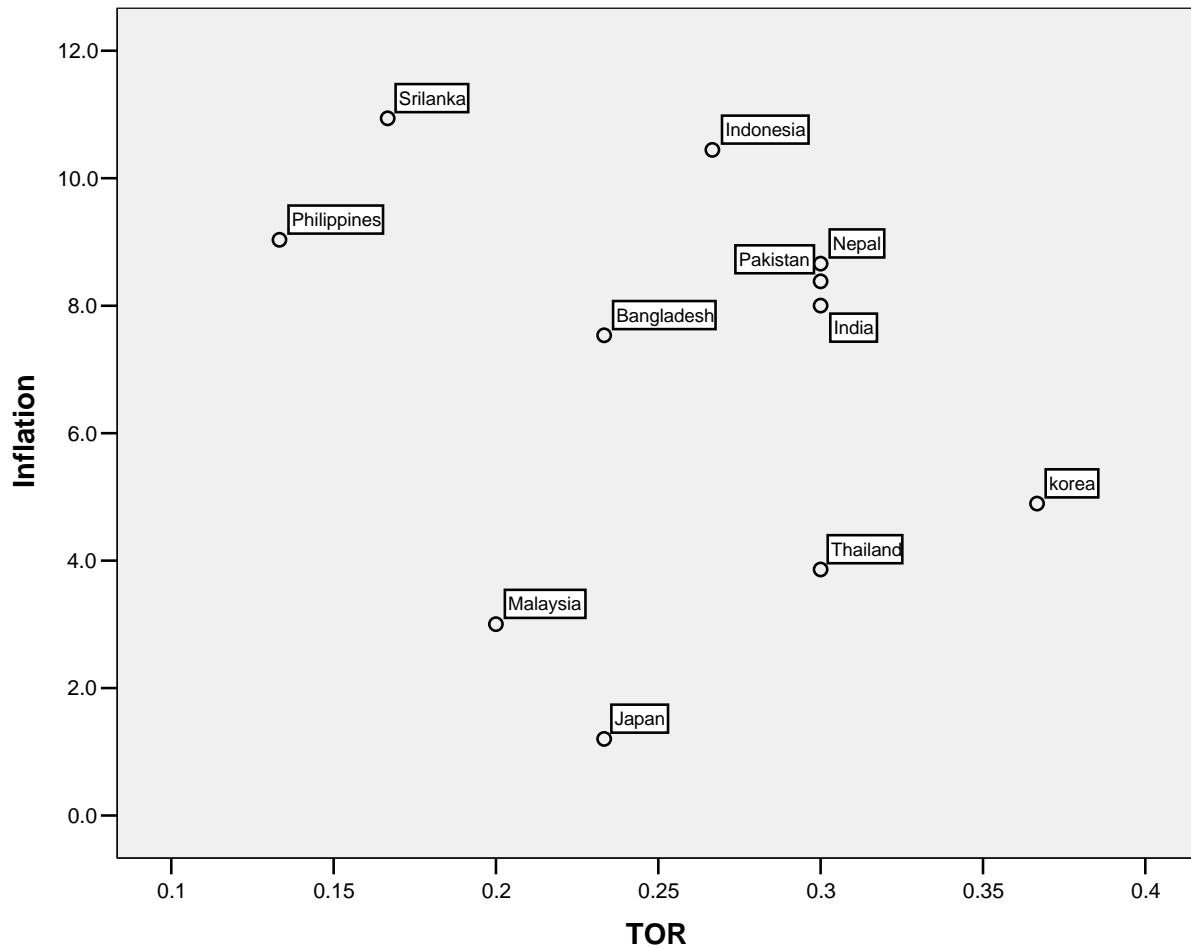


Figure shows that economies where TOR is higher, central bank enjoys low level of independence, inflation is also higher and mostly sample Asian economies lies in higher inflation and higher TOR range. Korea is exceptional case where however mid-level inflation prevails but TOR is also higher. So there is great variation in inflation level and TOR among the sample Asian economies. Higher TOR*deficit points out; Monetary authority have no or low say to refuse monetization of fiscal deficits. Similarly we can say fiscal deficits are particularly inflationary when central bank is not enjoying freedom in following its targets, thus in this way deficit are more strongly linked to inflation.

Model 4

In model four of table 6.4 we introduced the deficit as interactive term with two financial sector variables which are taken and converted to form lack of financial sector development. Thus we introduced deficit with lack of financial sector development variables. Two variables used here in study are private sector credit to GDP and Bank deposits. Both are used in literature to see the financial integration of the economy. More credit is distributed to the private sector shows more deepening of the financial sector in economy and this measure is used to see general level of development of financial markets in the economy. Private sector uses funds in more productive and efficient way than public sector uses funds and thus more productive investment by private sector ends up in growth and development. Similarly bank deposits are used to see how efficient the banking system is, as most efficient components of the financial sector are, banking system. This was developed by King and Levine (1993), it is actually the ratio of commercial bank assets divided by commercial bank plus central bank assets which measures the relative importance of a specific type of financial institution i.e. the commercial banks in the financial system. The basic rationale behind this measure is that commercial banks are more critical in exploring the more profitable opportunities than central banks so they are more efficient as well to utilize the funds in productive activities than central banks are (Ang and McKibbin: 2007). These two measures as lack of financial sector used as interactive term with deficits and expected signs were positive. Now in model four presents the estimated results how lack of financial sector have effects on inflationary effects of deficits. The coefficients values and signs are positives as well as they are statistically significant at 5 % level of significance. So they show that deficit is more severely linked to inflation as financial development depth is low. One point to ponder is that government is very much dependent on seigniorage because no other measure is available and financial intermediation is low, besides the fact since financial liberalization in decades of 1980s and

1990s there is huge improvements in financial intermediation in the developing and Asian economies. Results shows that this improvement is not enough, there is need to further improvement in refining and redefining the structural rigidities and hindrances in way of financial deepening. Comparing two regions shows that East Asia is at much better position in financial integration and intermediation then the south Asia. However one interesting and note worthy aspect is that there is great variation in developments level of the financial structure. As in some countries of the selected sample, equity market is more developed like in Hong Kong and Singapore, Korea and China have voluminous bond markets, Malaysia have strong bond and equity market with relation to its GDP, similarly Thailand's bond market is also growing. While in south Asia only India has the strongest and vibrant stock market, while in other economies like Pakistan the bond market development is very slow and domestic bond outstanding is 30 % of GDP²⁴. Mainly it consists of government bonds so there is long way to develop the bond markets in Pakistan. Overall the model specification test are satisfies, overall significance of the model is also statically significant. Sargan test also shows the valid instrument utilization. In model five all variables along with monetary and financial variables are re-estimated. Model 3, 4 and 5 presents the fact that deficits are inflationary for sample economies and particularly more inflationary when central bank independence is low and financial markets are less developed. Here when deficit is used as interactive term, deficit itself becomes negative, so this also shows that new variables lack CBI and less developed financial market are stronger in explaining inflationary impacts of deficits.

²⁴ According to state bank of Pakistan and securities and exchange commission of Pakistan .2012

TABLE 6.5
The GMM Estimates: Dependent variable (Inflation growth rate)

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Inflation(-1)	0.4559** (3.06)	0.3945** (2.62)	0.2878* (4.87)	0.4466* (3.15)	0.4559** (2.88)
B. deficits	0.0655** (3.39)	0.0471** (3.42)	0.0091** (2.08)	-0.0197** (-2.19)	-0.0410** (-2.78)
Rgdp	0.0045 (-0.82)	0.0049 (-0.89)	0.0033 (-1.54)	-0.0027 (-0.47)	0.0044 (-0.76)
R. Exchange rate	0.0940*** (1.95)	0.0712*** (-1.86)	0.0747** (-2.47)	0.0851** (2.11)	0.0097** (2.17)
Money growth		0.0721** (2.29)	0.0532* (5.42)	0.0613** (2.09)	0.0578*** (1.81)
Deficit*PVT				0.0059** (2.26)	0.0110** (2.98)
Deficit*bank-deposit				0.0039** (2.06)	0.0062* (4.06)
Deficit*TOR			0.0319*** (1.86)		0.0149** (2.56)
Constant	0.6189* (4.00)	0.4484 * (5.52)	0.5709* (5.54)	0.3395* (4.46)	0.3463* (3.73)
Financial crisis 2007-08 dummy	0.0316*** (1.76)	0.0439 (1.70)	0.0425*** (1.79)	0.0609*** (1.73)	0.0351*** (1.81)
Sargan test P-value	0.189	0.534	0.457	0.476	0.560
F-test	106.83 0.000	303.35 0.000	325.27 0.001	410.76 0.000	232.36 0.000
AR(1) P-value	0.039	0.039	0.033	0.039	0.032
AR(2) P-value	0.546	0.730	0.602	0.679	0.707
observations	145	145	145	145	145

NOTES: all value in parenthesis denotes t-stat. *, **, *** shows level of significant at 1, 5 and 10 % respectively. Panel regression, 1981-2010, estimated by GMM.

Table 6.5 presents the estimation results of system GMM performed for south Asian economies. The table 6.5 reveals that deficit has more strong impact on the south Asian region. The coefficient is 0.07 is significant with t-stat 3.39 at 5 percent level of significance, it shows that if there is one unit increase in budget deficit it will increase the price level by 0.07 units. This coefficient is quite different then overall value of coefficient and more significant then overall results in table 6.4, this result also confirms the positive association of deficit with inflation and also presents the facts that budget deficit are important determinants of inflation in south Asia as well. In model 2 of the table 6.5 growth rate of M2 is included to see its impact on the inflation level it is also significant and have positive impact on inflation, and results in respect to signs and significance are similar to overall results presented in table 6.4. In model 2 of table 6.5 real exchange rate included to see the impact of exchange rate fluctuations on domestic price level. It is positive and statistically significant; it presents the aspects of exchange rate pass-through, which defined as changes in exchange rate impacts on domestic inflation. Exchange rate will effect on each tradable good price. Different channel exist through which exchange rate fluctuation will effect domestic price level, but the important channel is direct short run impact of exchange on imported part of baskets of goods composed of CPI and imported goods. The impact is positive and statically significant in all estimation results.

In model 3 deficits is used as interactive term with TOR, which is significant and also revealing the fact that in sample countries monetary authority are not free in following its goals and objectives. In model 4 lack of financial sector development was used as interactive term with deficit so to capture the role of lack of financial sector development in inflationary impact of the deficit. Both model 3 and 4 also established the fact for South

Asian economies as well, that although deficit is cause of inflation in many economies, particularly in sample Asian economies, but financial structure and monetary authority independence is also crucial in explaining the dynamics. The instruments used are higher lags of the dependent and explanatory variables, along with exogenous variables in difference and lag form also applied as instruments for resolving the endogeneity problem in the above dynamic nature of model. The Sargan test in all the models accepted the null hypothesis about validity of the instruments as predicted from the p-value. Arellano-Bond AR tests also satisfied the model specification properties that there is no second degree autocorrelation in the errors terms.

6.3 Conclusion

Estimated results showed that deficits are inflationary in selected sample of Asian economies. Secondly deficits are particularly inflationary when central bank is not enjoying enough freedom in following its targets, and financial markets of the economy are not fully developed and fragile. Results also reveal the fact that deficits are more strongly linked to inflation, in South Asian region.

Chapter 7

CONCLUSION

The main objective of the study is to find relationship between deficit and inflation in presence of financial and monetary institutions. More specifically we want to explore the link of budget deficit when central bank is not independent and financial sector is not optimally developed. Theoretically and empirically most literature explored the link between fiscal deficit and inflation without considering the financial, political and social institutions. Paldam (1987), who explored the political factor behind the price hikes. Later on, many studies explored political structural and economic factor of rise in prices, but no confirm relationship posed and presented by literature, that's why hazy and unclear picture is revealed by the literature. This study has incorporated these two missing elements in the literature, especially, for developing countries particularly in Asian economies', following the base provided by Neyapti (2003). Study basically confirmed the myth for the selected sample, that for Asian economies deficit are inflationary. This statement is made with great cautions as money supply is culprit but we should not forget the other factors as well, which are significantly crucial for the developing economies. Estimated results confirmed the direct and indirect impact of budget deficit on inflation. However indirect impact of fiscal deficit is appeared stronger than the direct one it shows fiscal deficit leads to higher price level when money supply increases. So basically it also at one end confirming the MOENTRAIST approach towards inflation

Reforms of financial liberalizations in 1980s and 1990s proved to be significant, crucial and path leading for economic and financial development. But, the basic motivation of those reforms has not yet met by many Asian economies. Although wave of modernization of financial sector grasped the root of economies in Asia, but this did not implemented in true

sense. Legislative mandate modernized but autonomy to work on market forces and with free and devoted policy tools not guaranteed on practical bases. Central bank independence was one of the factors which was felt in wave of these reforms besides widening and Deeping the financial sectors, but independence is not optimal and political pressure is significant in most of the Asian economies, with the change in government there is immediate dismissal of governors seen in many economies, and especially south Asia is riskier and volatility is severe in fiscal deficit, high inflation and less developed financial markets and low independence of monetary institution.

One other result that can be deduced from the estimated results, that independence of the central bank also serve as stabilizing factor that will reduce the budget deficit, as more strong monetary institution will strongly stick with objective and will not be influenced by political authority ,so it will exert pressure on the fiscal authority for reducing the deficit through reducing its non-necessary budgets at one hand, and it will look up for other option to finance the deficit and one option is the financial markets ,so this interest will also serve as incentives for improvement and refining the existing structure of the financial setup. So this indirectly confirm other results posed by Goodman (1991) and Posen (1994, 1995), that financial sector always in support of independence of institutions, as it always favor the anti-inflationary policies. So one conclusive point of our study is that independence of the central bank will be having impact on the financial sector development in long run and it will serve as indicator of fiscal discipline.

Real exchange rate was also included, to see the impact of it on inflation. This is important in respect of monetary policy and it captures the “exchange rate pass through” aspect as discussed in literature. significant and positive impact of real exchange rate shows the international factors effecting the domestic price level through mechanism of imported

inflation which will effect the domestic price level, however different factor do involve that will determine the degree of exchange rate pass through, like credibility of central bank, Openness of the economy and the flexibility in price mechanism of domestic firms etc. The inflation persistence could be reduced if the credibility of the central bank is assured and it will be possible when it enjoys freedom in following its goals and targets. So when inflation is reduced then real exchange rate will have lesser impact on the domestic inflation level, and low level inflation is again linked to the independence and credibility of the central bank.(Takhtamanova:2010). Exchange rate pass-through also brings the interesting insights that in sample Asian economies, monetry policy is unstable and unpredictable.

Results and empirical findings of the study paved path for some policy recommendations and suggestions. Firstly, as it is founded that deficits do have inflationary impact, so fiscal policy makers should consider the deficit issues serious concerns and different measures to reduce or to maintain it within limits are necessary. Fiscal discipline is needed. As development programs are also part of the expenditures which are foremost important regarding social benefits and utility maximization, to reduce deficit may result in curtailment of these as well, which may be a difficult task to do for most of the sample economies and for developing world, so other means of financing should be considered and analyzed which are less inflationary.

Secondly, central bank should be free as much as possible from political pressure in following its targets and goals. Independence of monetary authority will work as incentive for stabilizing the price level and also serve as notion of independent authority in perusing its goals. Legislative amendments and restructuring the tenure, terms and conditions, board of governments and selection committee of working, performance and evolution of the central bank governor may also be taken under-consideration. As TOR is used as measuring variable

for the CBI, so minimization of political pressure is necessary for appointment and dismissal of the Governor.

Moreover the CBI should to also be promoted as it will exert pressure on the political decision makers to improve the fiscal policy making, so to avoid the debt crisis, which is often issue of the developing economies. Structural reforms in budgetary institutions and efficiency of fiscal administration is also complementary along with the independence of central bank.

Thirdly, however since financial reforms in late 1980s and 1990s have makes wonders in financial liberalizations around the world and in most of the economies financial structure have entirely changed the scenario of before and after financial reform. But many economies particularly developing one are lagging behind, from other developed economies in respect of financial integration and development. There is need to further improve and establish financial markets in sample economies. Many economies in Asian are staggering to cope and develop their financial markets and need of the hour is to refine the structural rigidities, refining of legislative process and attractive packages for international organization to setup their financial structure in domestic integration. As the financial crisis of 1997 for East Asian economies presented the basic deficiencies that create hindrance for financial markets in grasping their roots in the Asian regions. Comparatively East and South East region is much more developed and have performed better in financial integration aspect then south Asia ,only India has shown quite good performance in recent decades.

However the study has undertaken only one measure of Central bank independence which is defecto power measure. But different indexes like Bade and Parkin (1988) index, Grilli, Masciandaro and Tabellini (1991) and Cukierman (1992) also exist in literature which can be utilized with updated data for measuring legal aspects of CBI. Due to lack of data availability up to the time period taken for the study on all legal aspects covered in many indexes, these

indexes were not used in estimation procedure. However it is suggested and appreciated to explore these for further research. Political setup is also important to analysis how democratic and autocratic setup will effect the CBI impact on inflation. So there is also need to look into this aspect by further studies and also critical examination is required.

The sample selected is also based on the availability of data and some of the Asian economies are selected however extended sample with extended data set could be one step further in exploring the role played by the CBI and financial sector development. Mainly the monetary and fiscal variables remain the mere concern of this research study, however many other political, economic and agricultural variables also have impact on inflation level in domestic economy, which are assumed to be constant for analysis of this study. These other variables are openness, Agricultural output, international oil prices, political instability and corruption.

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Appendix:

Table A1
Fiscal balance, tax revenues and expenditure as % of GDP for south Asian economies

Countries	Tax Revenues				
	1980	1999	2007	2008	2009
Bangladesh	6.8	7.2	8.3	8.8	9
India	6.9	7.1	8.9	8.4	7.4
Nepal	6.5	8.5	9.8	10.4	11.8
Pakistan	13.9	14.1	10.3	10.3	9.5
Srilanka	17.8	16.9	14.2	13.3	12.8
Total expenditure					
	1980	1999	2007	2008	2009
Bangladesh	17.1	15.1	13.4	15.9	15.3
India	13.8	16.2	27.7	29.5	30.2
Nepal	14.9	18.6	15.9	17.6	20
Pakistan	25	23.9	19.2	21.7	19.3
Srilanka	35.8	27.3	23.5	22.4	24.7
Fiscal Balance					
	1980	1999	2007	2008	2009
Bangladesh	-9.1	-6.1	-3.2	-4.7	-4.1
India	-5.1	-4.1	-5.4	-6	-6.8
Nepal	-6.8	-7.7	-1.8	-2.1	-1.9
Pakistan	-4.8	-6.3	-4.3	-7.4	-5.2
Srilanka	-22.5	-8.9	-7.7	-6.8	-7

Table A2: Literature Review

Author(s)	Dependent variable	Sample	Independent variable	Technique	Result
Guess and Koford (1984)	inflation	17 OECD countries 1949-81	Deficits	Granger causality test	No significant relationship
Protopapadkis and Siegal (1986)	Money growth	10 industrial economies 1974-1983	Deficit	Rank correlation	Fiscal deficit not related to money growth
Simimi(2000)	Inflation	Iran 1973-1990	Deficit	2sls and simultaneous equations	Relationship do exists
Metin (1998)	Inflation	Turkey 1949-1981	Deficit	Conditional Model Technique	Positive
Kia (2010)	Inflation	Turkish economy 1970Q1-2003Q3	Deficit and variables other	VECM	Positive impact
Chimobi and Igwe (2010)	Inflation	Nigeria 1970-2005	Deficit and M2	VEC	Causal relation
Kilindo (1997)	Inflation	Tanzania 1970-84, 1984-91	Deficit and Money	OLS	Significant and Positive relation between 3
Hisbullah, Cheah,Baharom(2011)	Inflation	13 Asian countries 1950-1999	Fiscal Deficit, Seigniorage	Granger causality and ECM	Long-run relation between 3
Dejtbamrong (1993)	Money-supply	SEACEN 1974-II-1989-IV	Budget deficit	Reduce form equations	No effect of deficit on money in strong economies like Korea and

					Philippines
Pologne, Gonzalez and Ford (2008)	Inflation	Caribbean economies 1973-2002	Fiscal and monetary policy regimes	ARIMA	Policy regimes effect, exchange rate, trade and inflation pressure.
Sahan (2010)	Inflation	17 European Economies 1990-2008	Deficit	Larsson co-integration test	Positive relation exist between developing nation while no relation exist in developed nations
Lozano (2008)	Inflation	Columbia 1981-2007	Deficit and money	VECR	Causal relation between 3
Loungani and Swagal (2001)	Inflation	53 developing economies 1964-1998	Oil-prices, exchange-rate, and others	VAR	Selected variable have positive and significant impact on inflation
Montiel (1989)	Inflation	Argentina ,Brazil, and Israel 1973-1985	Fiscal deficit balance of payments	VAR	Balance of payment more effective then fiscal view
Ammama and Mughal (2011)	Inflation	Pakistan 1960-2010	deficits	Granger causality and co-integration	Deficits strongly effect inflation
Edward and Tabellini (1990)	Inflation	21 LDC 198	Seigniorage and deficits	OLS and instrumental variables	Optimal taxation theory rejected in all economies and political factors are more significant

Vieira (2000)	Inflation	6 EU economies 1950-1996	Deficits and Seigniorage	ARDL	Reverse causality is significant in the sampled economies
Aisen and Veiga (2006)	Inflation	100 economies 1960-99	Political instability	System GMM	Political institution have significant impact on inflation
Catao and Terrones (2005)	Inflation	107 economies panel set 1960- 2001	Deficits	MG and PMG	Strong positive relation between deficit and inflation in developing and high inflation countries
King and Plosser (1985)	Inflation	12 economies and USA different sample for each country	Deficits and money growth	VAR and single equation OLS	No causal relationship founded
Fisher et al (2002)	Inflation	94 economies 1960-1995	Deficits	Panel fix effect model	Important driver of inflation dynamics in developing and high inflation economies

Table A3: Description and sources of selected variables

S.No	Variable	Description
VAR 1	Inflation	Annual average rate of change in consumer prices. Annual series is taken from WDI for the period 1981-2010.
VAR 2	Deficit	Overall deficit as percentage of GDP are taken for analysis defined as “difference between total revenue and total expenditure”. Data is gathered from IFS.
VAR 3	Money supply	Growth rate of M2 is taken as measure of growth of money supply defined as “money and quasi money comprise the sum of currency outside banks, demand deposits other than those of the central government, and the time, savings, and foreign currency deposits of resident sectors other than the central government”. WDI is source of data.
VAR 4	Real GDP growth	This variable is included to see how business cycle fluctuation effects the domestic price level. Data is taken from world Economic Outlook.
VAR 5	Private sector credit to gdp	Private sector credit is used in study to measure financial sector development .Data is gathered from WDI.
VAR 6	Bank deposits	This indicator is used to measure depth and degree of the financial sector development. It is measure as ratio of deposit money bank domestic asset to deposit money bank domestic asset plus central bank domestic assets. Data taken from database of IMF constructed by Beck <i>etal</i> (2009)
VAR 7	TOR	Central bank Turnover rate of central bank governors is used as proxy of political measurement of independence of central bank. Turnover rate data is extracted from index that is calculated by Sturm, Jan-Egbert and Jakob de Haan (2001).
VAR 8	Real Exchange rate	Defined as a unit of domestic currency relative to U.S dollar, means higher value is associated to real exchange rate depreciation and vice versa. Data taken from Penn world tables 7.0

A4: Fixed and random effect model

Fixed-effects (within) regression
 Group variable: id

Number of obs = 319
 Number of groups = 11

R-sq: within = 0.1266
 between = 0.6987
 overall = 0.2121

Obs per group: min = 29
 avg = 29.0
 max = 29

corr(u_i, xb) = 0.0254

F(10,298) = 4.32
 Prob > F = 0.0000

d1	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
d1						
L1.	.2070721	.0565658	3.66	0.000	.0957531	.318391
defcigtgdp	-.3010825	.1175557	-2.56	0.011	-.5324269	-.069738
pvt	.0636168	.0194665	3.27	0.001	.0253075	.101926
dummyfinan~1	.2190365	.2198257	1.00	0.320	-.213571	.6516439
southasiad~y	-.168385	.7269594	-0.23	0.817	-1.59901	1.26224
moneygm3	.0657565	.0639052	1.03	0.304	-.0600061	.1915191
tt	.39292	.2576569	1.52	0.128	-.1141374	.8999775
rgdpg	.0018952	.0142703	0.13	0.894	-.0261882	.0299785
lexc	.1549727	.2615181	0.59	0.554	-.3596835	.6696289
depdef	.0297037	.0256429	1.16	0.248	-.0207604	.0801678
_cons	.4109512	.4333388	0.95	0.344	-.4418407	1.263743
sigma_u	.1772213					
sigma_e	.70973865					
rho	.05869045	(fraction of variance due to u_i)				

F test that all u_i=0: F(10, 298) = 0.64 Prob > F = 0.7809

Random-effects GLS regression
 Group variable: id

Number of obs = 319
 Number of groups = 11

R-sq: within = 0.1243
 between = 0.9072
 overall = 0.2412

Obs per group: min = 29
 avg = 29.0
 max = 29

Random effects u_i ~ Gaussian
 corr(u_i, x) = 0 (assumed)

wald chi2(10) = 97.92
 Prob > chi2 = 0.0000

d1	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
d1						
L1.	.2261824	.0556424	4.06	0.000	.1171254	.3352394
defcigtgdp	-.2585074	.0811967	-3.18	0.001	-.41765	-.0993648
pvt	.0578463	.0162159	3.57	0.000	.0260638	.0896289
dummyfinan~1	.222939	.2173307	1.03	0.305	-.2030213	.6488993
southasiad~y	.019381	.1324995	0.15	0.884	-.2403133	.2790753
moneygm3	.0794823	.0610223	1.30	0.193	-.0401193	.1990839
tt	.2591054	.1462238	1.77	0.076	-.0274881	.5456988
rgdpg	.0056343	.0132807	0.42	0.671	-.0203955	.0316641
lexc	.2064735	.1443624	1.43	0.153	-.0764716	.4894186
depdef	.0311894	.0227927	1.37	0.171	-.0134834	.0758623
_cons	.1982459	.163547	1.21	0.225	-.1223003	.5187921
sigma_u	0					
sigma_e	.70973865					
rho	0	(fraction of variance due to u_i)				