# The Impact of Institutional Quality on Monetary Policy in Pakistan

By

Abdul Wajid

Supervisor:

Dr. M. Idrees Khwaja

A dissertation is submitted to Pakistan Institute of Development Economics (PIDE), Islamabad in fulfillment of the requirements for the degree of Masters of Philosophy (M.Phil) in Economics.

(January, 2013)

Department of Economics

**PAKISTAN INSTITUTE OF DEVELOPMENT ECONOMICS, ISLAMABAD**

# Table of Content


| Contents | Page |
|---|---|
| Table of Content | i |
| List of Tables | iii |
| List of Figures | iv |
| Acronyms | v |
| Acknowledgement | vi |
| Abstract | vii |
| Chapter 1: Introduction | 1 |
| 1.1 Introduction: | 1 |
| 1.2 Objectives of the Study: | 4 |
| Chapter 2: Review of Literature | 5 |
| 2.1 Institutional Quality and Economic Growth: | 5 |
| 2.2 Institutional Quality and Monetary Policy: | 7 |
| 2.3 Institutional Quality and Cyclicality of Monetary Policy: | 9 |
| 2.4 Taylor Rules: Studies for Pakistan: | 10 |
| Chapter 3: Theoretical Framework | 13 |
| 3.0 Theoretical Framework: | 13 |
| 3.1 The Loss Function: | 14 |
| 3.2 The IS curve: | 14 |
| 3.3 The Phillips curve: | 15 |
| 3.4.1 Standard Reaction Function: | 15 |
| 3.4.2 Modification in Reaction Function: | 16 |
| 3.5 Institutional quality and interest rate channel of monetary policy: | 18 |
| 3.6 Expected Signs of the Variables in the Model: | 20 |
| Chapter 4: monetary policy management in Pakistan | 24 |
| 4.1 Pre-Reform (1984 – 1990): | 24 |
| 4.2 Era of Reforms (1990–1997): | 26 |
| 4.3 Post reforms (1998 – 2011): | 28 |
| Chapter 5: Empirical model, Data and variables | 31 |
| 5.1 Empirical Strategy: | 31 |
| 5.1.1 ARDL method to Cointegration: | 32 |
| 5.1.2 Cointegration test: | 32 |

5.1.3 Long Run Relationship: 33
5.1.4 Dynamic Short Run Relationship and Error Correction: 34
5.2 Data, Variable Definition and Construction: 34
5.2.1 Data Span: 34
5.2.2 Output Gap: 35
5.2.3 Inflation: 36
5.2.4 Rate of Interest: 36
5.2.5 Institutional Quality: 37
5.3 Test of Stationarity: 41
Chapter 6: Empirical Results: 43
6.1 Descriptive Statistics: 43
6.2 Correlation and Graphs: 43
6.3 Test of Stationarity: 45
6.4 Estimation Results: 46
6.4.1 Cointegration Test: 47
6.5.2 Breusch-Godfrey Serial correlation LM test: 47
6.4.3 Ramsey RSET Test: 48
6.4.4 CUSUM and CUSUM Square Test: 48
6.5 Long Run Relationship: 49
6.5 Dynamic Short Run Relationship: 50
6.6 Discussion: 51
Chapter 7: Conclusion and recommendations 54
References: 56

# List of Tables:


Table 3.1: Expected Signs of variables 20

Table 4.1: Pre-Reforms Period Problems 25

Table 4.2: Financial Sector Developments (1992 – 1997) 27

Table 4.3: Financial Sector Developments (1998 – 2011) 28

Table 5.1: Ordinary Correlation 37

Table 6.1: Descriptive Statistics 43

Table 6.2: Ordinary correlation 43

Table 6.3: Unit Root Tests 45

Table 6.4: Test Equation Results 46

Table 6.5: Bound Test 47

Table 6.6: Breusch-Godfrey Serial correlation LM test 47

Table 6.7: Ramsey RSET Test 48

Table 6.8: Long Run Relationship 49

Table 6.9: Dynamic Relationship 50

# List of Figures:

Figure 6.1: Interest rate and Inflation 44
Figure 6.2: Interest rate and Output Gap 44
Figure 6.3: Interest rate and Institutional quality 45
Figure 6.4: CUSUM Plot 48
Figure 6.5: CUSUM Square Plot 49

# Acronyms

| | |
|---|---|
| ACP | Annual Credit Plan |
| AD | Aggregate Demand |
| ADF | Augmented Dickey Fuller (Test) |
| AIC | Akaike Information Criterion |
| ARDL | Autoregressive Distributive Lag |
| ATM | Automated Teller Machine |
| CDR | Credit to Deposit Ratio |
| CLA | Corporate Law Authority |
| CUSUM | Cumulative Sum |
| FDI | Foreign Direct Investment |
| FI | Financial Institutions |
| FIB | Federal Investment Bonds |
| FP | Fiscal Policy |
| GDP | Gross Domestic Product |
| H-P | Hodrick Prescott |
| ICRG | International Country Risk Guide |
| IFS | International Financial Statistics |
| IMF | International Monetary Fund |
| IQ | Institutional Quality |
| KPSS | Kwiatkowski–Phillips–Schmidt–Shin (Test) |
| MP | Monetary Policy |
| NBFI | Non Banking Financial Institutions |
| OMO | Open Market Operation |
| PBC | Pakistan Banking Council |
| PCA | Principle component Analysis |
| PP | Phillips Perron (Test) |
| Repo | Repurchase Agreement |
| RR | Reserve Requirements |
| RSET | Regression Equation Specification Error Test |
| SBP | State Bank of Pakistan |
| SBC | Swartz Bayesian Criterion |
| SLR | Statutory Liquidity Requirements |
| T-Bill | Treasury Bill |
| U.S | United States |
| WB | World Bank |

# Acknowledgement

This research would never have materialized without the contribution of many people to whom I have the pleasure of expressing my appreciation and gratitude. First and for most, I would like to express my sincere and deepest gratefulness to my supervisor, Dr. Idrees Khwaja for his intellectual advice, guidance and encouragement. The regular discussions, from proposal writing till the final composition, were very valuable and inspiring at every step of this research. I thank him from the core of my heart.

Moreover, I would like to thank Mr Muhammad Ramzan, Muhammad Nawaz, Hasan Siftain, Shahzad Ahmed for their encouragement and support. They have been a source of great help to me. I would also like to thank Ms. Unbreen Qayyum for her help and appreciation at every step of my research. Friends who do not lose faith are the best ones to have. I thank all my friends whose names are not included but without their support it would have been difficult for me to compile such a great work.

Last but not least, I would like to express my deepest appreciation to my family, especially my mother and brother, for their care, love, advice and selfless support in every respect during the course of the study.

My last words of appreciation and respect are reserved to my beloved father (late), who's encouragement, love and true guidance flourished in me the very spirit of free inquiry and made me the man who I am today. I am sorry father – you are not here to witness my accomplishment. I miss you so much.

Abdul Wajid.

# Abstract

This study seeks to examine whether the monetary management in Pakistan is conducted under the framework advocated by the Taylor rule. We investigate this question after modifying the Taylor rule to control for the influence of institutional quality on monetary policy. Even after controlling for institutional quality, we find no evidence that the central bank makes use of the Taylor framework in devising monetary policy. Our results also suggest that by and large the focus of the monetary policy has been on containing inflation.

# Chapter 1: Introduction

## 1.1 Introduction:

A growing body of literature now maintains that sound institutions[1] are essential for sustainable economic growth. Institutional quality can effect overall economic growth by providing the underlying environment for economic activity to flourish. Recent developments in institutional economics suggest that besides affecting the overall economic activity, institutions can also affect the conduct, transmission, as well as the cyclical properties of monetary policy[2]. The primary goal of the monetary policy is to stabilize prices and to promote sustainable growth. There is debate in literature whether the monetary policy should be conducted based on some predetermined rule or should the policy maker enjoy discretion in the conduct of monetary policy. Though the debate is not fully settled but literature seems to favor rules over discretion[3]. Barring some exception, the monetary policy has not been able to rein in inflation or stabilize output in Pakistan (Qayyum, 2008). This makes it important to thoroughly examine how the monetary policy is conducted, whether the authority follows a rule or the discretion is allowed to influence the monetary policy. This type of investigation has been conducted for Pakistan using the standard Taylor rule framework[4], however the standard Taylor rule does not account for the influence of institutions on monetary policy. This study examines the conduct of monetary policy by augmenting the Taylor rule to account for the influence of institutional quality on monetary policy. This has not been done so far in case of Pakistan.

[1] North (1990) defines institutions as "*the humanly devised constraints that shape human interaction*". These constraints are further divided into formal rules (constitutions, laws, rules etc.) and informal constraints (norms, conventions, self imposed code of conducts etc.).

[2] See for example Huang and Wei (2006), Calderon *et al.* (2010), Choudhary *et al.* (2010), Duncan (2011) etc

[3] See for example taylor (1993, 1997, 2007), Clarida *et al.* (1999), Barro and Gordon (1983), Sevenson (1996) etc

[4] Studies include Malik and Ahmed (2007), Malik (2007), Iqbal (2009), Malik and Ahmed (2011) etc.

Institutional quality may affect monetary policy directly, by, affecting the autonomy of the central bank [Hielscher and Markwardt(2011), Dai *et al.* (2010), Mathew (2006)], generating fiscal dominance and affecting the working of financial institutions and creating rigidities [Law and Azman-Saini (2008), Delis (2012), Miletkov and Wintoki (2012)]. It can also effect monetary policy by affecting the objectives of monetary policy; usually defined as stabilization of inflation and output.

Poor institutional quality can adversely affect the monetary management by limiting the independence of central bank and creating rigidities in the financial sector. Limited independence of the central bank will lead to discretion based policies which have the property of dynamic inconsistency[5]. Further it will also translate into fiscal dominance. Literature shows that institutional quality and financial development go hand in hand [Osili and Paulson (2004), Law and Azman-Saini (2008), Delis (2012), Miletkov and Wintoki (2012)]. With low institutional quality the state of financial intermediation will remain poor due to market frictions and low pass through of policy rate.

Institutional quality can influence the responsiveness of the aggregate investment to the changes in rate of interest (Aysan*et al.*, 2007). When an investor observes weak institutional quality – characterized by poor law and order, poor investment profile, corruption, government instability and poor bureaucratic quality – he puts off future investment plans. Ominous law and order situation is accompanied by strikes and non-availability of labor, hindering current production and future investment. Government instability can also play its part in investor's decision making; investment being a long term phenomenon, unstable government may create fear of loss among investors due to policy reversals and expropriation of private property by

[5] Dynamic inconsistency was identified by Kydland and Prescott (1977).

the way of nationalization and freezing of accounts etc. Poor contract enforcement and unenforced property rights reflecting poor investment profile will also discourage investment[6]. Further, excessive red tape, captured by bureaucratic quality may also hinder investment. Low institutional quality is often supplemented by corruption which increases the cost of investment. All these factors eventually adversely influence investment and output and constrain the ability of monetary policy to influence output.

Literature suggests that countries with lower institutional quality also have higher inflation [Huang and Wie (2006), Dimakou (2006)]. Lower institutional quality induces inflation by forcing the central bank to print money as the formal channels of revenue generation are inefficient. This happens because of high corruption, unstable government, poor bureaucratic quality and poor investment profile. When these components are weak then government will be unable to cover budget deficit through formal tax revenues and will be forced to resort to the central bank. Given limited independence, the central bank yields to the demand of the government to print money. This seignorage will contribute to inflation.

Institutional quality has been included in monetary framework in diverse ways. It has been modeled in the production function (Choudhary *et al.*, 2010), loss function of the monetary authority (Huang and Wie, 2006) and as a variable in Taylor type rule [Calderon *et al.*(2010) Duncan(2011)]. Of the three methods, literature favors the inclusion of the institutional quality in the Taylor rule framework [Duncan (2011), Calderon *et al.*(2010)]. This study includes the institutional quality in the monetary rule. So far, no empirical study to our knowledge has incorporated the institutional quality in the monetary rule for Pakistan.

[6] Discussed at length in North (1990), Acemoglu (2002)

One of the problems often described to be a consequence of low institutional quality is the procyclicality of macroeconomic policies, often regarded as a norm in developing countries (Frankel, 2010). The procyclicality of monetary policy has been regarded as the major reason for the ineffectiveness of monetary policy in developing nations as a stabilization tool. The literature suggests that monetary policy is procyclical in Pakistan but these studies have not included institutional quality[7]. We seek to re-examine the cyclical properties of monetary policy by controlling for institutional quality.

### 1.2 Objectives of the Study:

The objectives of this study are:

1. To estimate the monetary policy reaction function for Pakistan by incorporating institutional quality variable in the Taylor rule framework.
2. To examine whether the monetary policy is procyclical or counter cyclical by incorporating institutional quality in the traditional framework.

Rest of the work has been organized as follows. Chapter 2 reviews the literature on the institutional quality and growth, institutional quality and monetary policy and the Taylor rule. Chapter 3 describes the theoretical framework of the study. Chapter 4 reviews the monetary policy practiced in Pakistan during the data span (1984 – 2011), especially with reference to the changes in monetary regimes. Chapter 5 describes the empirical model and related matters like the data and variables. Chapter 6 is devoted to reporting of results and their interpretation and chapter 7 concludes the study.

[7] For example: Malik and Ahmed (2007), Malik (2007) Islam (2009) etc.

# Chapter 2: Review of Literature

This chapter is devoted to the review of literature. Broadly, the relationship of institutional quality with economic growth and monetary policy is reviewed. The literature on cyclicality of monetary policy and Taylor type rules has been also discussed.

## 2.1 Institutional Quality and Economic Growth:

The neo-institutional economist[8] stress that institutional factors play an important role in the process of economic growth. One of the channels through which institutional quality effects the economic growth is investment. Developing nations often rely on foreign direct investment while evidence suggest that foreign investors take into consideration the institutional quality before undertaking investment decision. Using state activism, property rights and corporate governance as a measure of institutional quality, Huang *et al.* (2004) examine the relationship between institutional quality and growth by disaggregating foreign direct investment into investment that supports local entrepreneurship and investment that replaces local entrepreneurship. They find that institutional quality influence foreign direct investment. They further find that foreign direct investment that supports local entrepreneurship translates into sustainable growth.

Standard neoclassical theory predicts that capital should flow from rich to poor countries. Lucas (1990) pointed out that this was not borne by empirical evidence. Alfaro *et al.* (2008) implicitly provides an explanation for what Lucas (1990) pointed out. The authors show that the cross-country differences in the economic

[8] like Douglass North, Darron Acemoglu and Dani Rodrik etc

fundamentals affecting productivity and capital market imperfections are primarily caused by low institutional quality.

European colonizers established different institutions in different colonies. Some countries had institutions conducive to growth while others were extractive in nature. Acemoglu *et al.* (2001) argues that whether the colonies developed growth conducive or extractive institutions depends upon whether or not the colonizers could settle themselves in those colonies. There settlement was linked to mortality rate/disease environment that the colonies faced. They argue that differences in per capita income depend upon institutions of the particular colony and these differences disappear once institutional differences were accounted for. Further, Acemoglu *et al.* (2002) find that it is the institutions that explain the cross country variation in output variability rather than the conventional macroeconomic variables. Acemoglu *et al.* (2004) noted that the effectiveness of macroeconomic policies depend upon the institutions of the country. Institutional explanations also resolved some anomalies related to the conventional growth theories as to why there is no support for income convergence hypothesis and why convergence occurs most rapidly in low income countries (Knack, 1996).

Corruption is the most widely used indicator of institutional quality. This may adversely influence growth[9] through its influence on a number of economic variables like investment (Mauro, 1995) bureaucratic efficiency (Shleifer and Vishey, 1993) income distribution and government spending (Xu *et al.*,2000) etc.

[9] Mauro (1995), Keefer and Knack (1997), Dreher and Herzfeld (2005)

Despite the effect on output, studies have also found that institutional quality also affects the volatility in output [Acemoglu *et al.* (2002), Barseghyan and DiCecio (2010), Duncan (2011)]. Together, these studies establish that institutional quality affects the output and volatility in output.

### 2.2 Institutional Quality and Monetary Policy:

Traditionally, monetary policy and institutional quality have been treated as independent disciplines. Initially, studies were conducted in a principal agent framework to assess the potential negative impact of corruption among government officials, who secured bribes from private citizens interested in government produced goods, on the development of a nation. These studies pointed at identifying the motivating factors among the agents to be honest– the honest the official, the higher the payoff for the nation. Huang and Wei (2006) model the role of institutions in the effectiveness of monetary policy. Using corruption as a proxy of institutional quality they show that institutional quality has implications for the conduct and transmission of monetary policy. They argue that weak Institutions can directly affect monetary policy by weakening the monetary authority in terms of autonomy and by eroding the credibility of the central bank. Huang and Wei find that given poor institutional quality, exchange rate pegs which are thought to solve the credibility issue do not result in credibility of the central bank. They further find that dynamic inconsistency can be avoided in discretionary regime by a Rogoff-type[10] central banker whose conservatism and institutional quality are proportional. The study finds that optimal monetary target for countries with weak institutions are higher than countries with strong institutions. They further assert that for countries with weak institutions external pressure to improve the institutional quality will not deliver required results.

[10] A central banker who has great distaste for inflation

Weak institutions may also result in fiscal dominance. Dimakou (2006) finds that weak institutional quality may present incentive for the fiscal authority to increase the debt and force the monetary authority to pursue an expansionary policy despite its independence, even if the fundamentals require just the opposite. If this happens then the central bank will be forced to increase the policy rate of interest to achieve price stability. They further show that central bank's independence in countries with weak institutions may not result in lower inflation.

Weak institutions can also affect the conduct of monetary policy indirectly by inducing inflation thereby forcing the monetary policy to react. Huang and Wei (2006) suggests that institutions and tax collection ability of the government are related. This could be due to outright theft by tax officials or their collusion to reduce tax obligation in exchange for a bribe. This will result in deficit as formal taxes are insufficient to cover the expenses pushing governments to rely on the seignorage which causes inflation. Numerous studies suggest positive relationship between seignorage and inflation [Al-Marhubi (2000), Blackburn *et al.* (2008) etc]. Dimakou (2008) refutes the claim of Huang and Wei (2006) that countries with low inflationary framework cannot be induced to improve institutional quality. They further show empirically that countries which follow inflation targeting have better institutions.

Low institutional quality may also lead to financial crises. Wu (2008) examines the theoretic relationship between institutional quality and the currency/financial crises where weak institutions cause leakage of tax revenues. As a result, the authorities may have to rely on seignorage, thus increasing their incentive to deviate from the exchange rate peg. He finds that that institutional weakness contributes to

self-fulfilling crisis equilibrium and therefore causes devaluation when crises occurs.

### 2.3 Institutional Quality and Cyclicality of Monetary Policy:

Procyclicality of macroeconomic policy is often described as a problem faced by developing countries (Frankel, 2010). Procyclical monetary policy is harmful because it reinforces the business cycle (Kaminsky*et al.*,2005). Procyclical monetary policy harms the economic activity because during the periods of rapid economic growth (booms) expansionary monetary policy is pursued leading to overheating of the economy and thereby exerting inflationary pressure while during periods of slower economic growth (busts) contractionary monetary policy is pursued further pushing the economy towards recession. Calderon *et al.*(2010) argues that procyclical monetary policy is pursued when central bank lacks credibility. They argue that the difference in cyclical stance of macroeconomic policy among economies may be attributed to difference in their levels of institutional quality. They find that level of institutional quality plays a key role in country's ability to implement counter cyclical macroeconomic policies, i.e. Countries with strong institutions adopt counter cyclical polices.

Choudhary *et al.* (2010) shows that, by incorporating governance at firm level in a small open economy, the procyclical monetary policy stance of emerging market economies facing external demand shocks is justified. They argue that weak governance adversely affect the net worth of the firms which leads to lower market value of the firms. This leads to depreciated net worth, lower collateral and hence inability to raise finance ultimately leading to lower output and building pressure on the exchange rate. The authors argue that the reason for conducting procyclical

monetary policy is to protect the exchange rate. They find that weak institutions may exacerbate the effect of adverse external demand shock which result in non-availability of credit to firms. In this scenario, the central bank reacts with a contractionary monetary policy to achieve exchange rate stability.

Extending the work of Calderon *et al.* (2010), Duncan (2011) studies the role of institutional quality in explaining the cyclicality of monetary policy. Duncan (2011) theoretically models institutional quality in a dynamic stochastic general equilibrium model. In his model the foreign investor's portfolio consists of either investing in the domestic economy or lending to domestic consumer. When a favorable demand shock is observed than the output and exchange rate will increase. Increase of exchange rate has two opposite effects: it increases the cost of leisure which leads to increase in labor supply; it decreases the real value of foreign debt leading to decrease in labor supply (wealth effect). In case of lower institutional quality when faced with favorable demand shock the economy will attract fewer loans and hence the wealth effect channel will not work, this will increase the labor supply and lower inflation. Central bank will react by lowering the rate of interest and hence a procyclical monetary policy stance will be observed.

### 2.4 Taylor Rules: Studies for Pakistan:

It is now well established that monetary policy rules perform better than discretion based monetary policy decisions [Taylor (1993, 1999, 2007), Clarida *et al.* (1999), Svensson (1996, 2003)]. Developing nations can perform well by following simple rules (Taylor, 1999). There are limited studies for Pakistan on interest rate based reaction functions despite its importance and pronounced shift of monetary tools from

quantitative control to market based measures since 1991, where interest rate plays an important role.

Studies that have estimated Taylor rule for Pakistan include Malik and Ahmed (2007), Malik (2007), Islam (2009), Iqbal (2009), Sulaiman *et al.* (2011) and Malik and Ahmed (2011). All these studies find that the central bank has not been following Taylor rule for the conduct of monetary policy. Malik (2007) and Islam (2009) using counter factual simulations argue that economic performance could have been improved, had the central bank followed Taylor rule. Malik and Ahmed (2007) argue that the reason for non observance of the rule could be that besides the stability of output and inflation the central bank follows other objectives as well e.g. exchange rate stability. They further argue Taylor rule does not hold for Pakistan even after adjusting upwards the parameters of inflation and output gap.

One of the problems often faced by monetary policy of developing nations is the procyclicality of monetary policy[11]. Malik and Ahmed (2007) and Islam (2009) find that Pakistan has also been facing this problem as the coefficient of output gap is negative in the Taylor type rule and attribute it to external shocks and such factors effecting inflation that are beyond the purview of monetary authority. They argue that monetary policy has been more concerned about inflation stabilization.

All of these studies have failed to find classical Taylor type relationship in the conduct of monetary policy of Pakistan. After failing to observe the classical relationship, they have modified the Taylor type rule by augmenting the Taylor rule with other objectives that the monetary authority may take into consideration.

[11] Kaminsky *et al.* (2005), Frankel (2010), Calderon, *et al.* (2010), Duncan (2011)

These objectives may include interest rate smoothening, exchange rate management, reduction of trade deficits, government borrowings etc. Most of the studies find that the central bank follows policy of interest rate smoothening while some studies find exchange rate stabilization also significant.

All these studies established that SBP has not been following Taylor type rule even after modification of the original rule proposed by Taylor (1993) with one exception: Malik and Ahmed (2011) find that Pakistan has been following Taylor type rule when interest rate smoothening and exchange rate management is accounted for. Malik and Ahmed (2011) argue that the central bank has been more concerned about output stabilization as opposed to there earlier finding. They further establish that only dynamic version of Taylor rule fits Pakistani data.

# Chapter 3: Theoretical Framework

In this chapter, we describe the theoretical model and discuss the relationship among the variables based on theory.

**3.0 Theoretical Framework:**

We seek to examine the effect of institutional quality on monetary policy. Based on recent literature, our premise is that institutional quality affects the outcomes of monetary policy. One way to characterize the monetary policy of a country is through the Taylor type rule. The Taylor rule[12] recommends increasing the policy rate of interest when inflation is above target and lowering interest rate when recession appears to be more of a threat. The Taylor rule works on the assumption that the interest rate channel of monetary policy is very effective (Taylor, 1993). Recently, there has been a surge in the literature to incorporate institutional quality into monetary policy framework[13]. Few studies which have examined Taylor rule for Pakistan conclude that the central bank does not follow the Taylor rule[14]. Given the view that institutions influence the conduct of monetary policy, it is important to revisit the Taylor rule for Pakistan while controlling for institutional quality.

The interest rate channel of monetary policy which is the key to effectiveness of Taylor rule is based on the new Keynesian framework of the monetary policy transmission. Taylor rule can be derived using the new Keynesian framework in which the monetary policy reaction function is derived from three equations; the central bank's loss function, the IS curve and the Phillips curve. We briefly describe

[12]Taylor (1993) defined the rule over inflation and output gap as: $i_t = r^* + 0.5y_t + 1.5\pi_t$ , where $i_t$ =federal funds rate, $\pi_t$ =inflation, $r^*$ = real rate of interest, and $y_t$ =output gap.

[13] See for example Huang and Wei(2006), Dimakou (2006), Wu(2008), Calderon *et al.*(2010),Choudhary*et al.*(2010)Duncan (2011) to name a few

[14]For example Malik (2007), Malik and Ahmed (2007), Islam (2009), Malik and Ahmed(2011) etc

these equations below and then introduce institutional quality in the reaction function and discuss its rationale.

### 3.1 The Loss Function:

The central bank's loss function translates the behavior of output and inflation into a welfare measure to guide the policy maker regarding the policy choices (Clarida *et al.*, 1999). This function of the central bank summarizes the relative weights which the monetary authority puts on the volatility in output and inflation; generally the loss function is expressed in a quadratic form and can be specified over inflation and output gap as:

$$\min \mathcal{L} = f(\pi_t^2, x_t^2) \dots \dots \dots \dots \dots \dots \dots \dots (3.1)$$

Where $x_t$ is the output gap defined as the difference between the actual output and the potential output (natural rate of output) i.e. $x_t = y_t - y_t^*$ and $\pi_t$ is the inflation rate. The monetary authority tries to minimize the volatility of these two variables. Central bank faces a tradeoff between containing inflation and loss in output (Khan, 2003). The aim of the central bank is to minimize the loss in output while keeping the rate of inflation under control.

### 3.2 The IS Curve:

The IS curve, derived from the optimizing behavior of the household, captures the demand side of the economy. The IS curve in New Keynesian framework is given by the following equation:

$$x_t = g(i_t - \pi_t, x_{t-1}) \dots \dots \dots \dots \dots \dots \dots \dots (3.2)$$

Where $x_t$ is the output gap, $i_t$ is the nominal rate of interest and $\pi_t$ is inflation thus $(i_t - \pi_t)$ is the real interest rate. The standard IS curve relates output inversely to the real rate of interest and depends positively on the lag of output gap. Current output gap depends on output gap in the previous period because agents prefer to smoothen consumption. The negative relationship of the output gap with the real rate of interest reflects the inter-temporal substitution of consumption.

### 3.3 The Phillips Curve:

The Phillips curve describes the standard relationship between the growth rate of prices (inflation) and output gap. The standard form of the Phillips curve is given by:

$$\pi_t = l(\pi_{t-1}, x_t) \dots \dots \dots \dots \dots \dots \dots \dots (3.3)$$

The Phillips curve relates inflation positively to the output gap and to its own lag which reflects inflation inertia (Clarida *et al.*, 1999). The Phillips curve is derived from the optimizing behavior of monopolistic firms facing sticky prices. It captures the supply side of the economy.

### 3.4.1 Standard Reaction Function:

Assuming that the central bank follows an interest rate based reaction function; the standard reaction function is given by:

$$i_t = \psi(\pi_t, x_t) \dots \dots \dots \dots \dots \dots \dots \dots (3.4)$$

The above mentioned reaction function depends positively upon inflation and output gap. It is derived by minimizing the loss function with respect to the IS curve and the Phillips curve. This reaction function shows that the central bank sets its policy rate considering the state of the inflation and output gap.

### 3.4.1 Modification in Reaction Function:

The literature suggests that developing economies have been perusing objectives other than the ones reflected in the standard policy reaction function [Khan (2003), Malik and Ahmed(2007)]. Islam(2009) argues that during the decade of 1990's and the early part of the first decade of 2000's, profound economic transformation occurred in these economies like liberalization of prices and trade which resulted in surge in inflation and large external imbalances. Due to these reasons monetary authorities also pursued objectives not reflected in the standard policy reaction function. A vast body of literature shows that a variant of the reaction function given by 3.4 has explained the monetary policy stance of the developed nation efficiently but in case of developing nations the reaction function has failed to fully capture the stance of monetary authorities [Malik (2007), Islam(2009)].

Taylor (1993) framed a rule to explain the behavior of monetary authority. He showed that this reaction function, which, later on, was known as Taylor rule, explained the behavior of the monetary authority from 1984 to 1992 of United States. However, later on some studies showed deviations from the rule (Hofmann and Bogdanova, 2012). Although most economists believe in the usefulness of the rule based monetary policy but consensus on the detailed specification is yet to be achieved (Kozicki, 1999). Malik and Ahmed (2007) argue that the parameters suggested in original work of Taylor were not applicable to the developing nation and even after adjusting these parameters sufficiently upwards; this model fails to explain the stance of monetary policy in Pakistan. As explained earlier, institutional quality might affect outcomes of monetary policy and the non applicability of Taylor rule may be due to non inclusion of institutional quality in the monetary policy reaction function.

Developing countries are characterized by weak institutions which in turn affect the outcomes of monetary policy, for example, inflation may not decrease in the face of contractionary monetary policy and accommodative monetary policy may not stimulate output. The influence on inflation may come from seignorage. Huang and Wei (2006) argue that countries with low institutional quality are unable to generate sufficient revenue through formal taxes, due to leakages and corruption, so to cover deficit they rely on seignorage which spurs inflation.

$$\text{Low IQ} \rightarrow \text{Low Tax Revenue} \rightarrow \text{High Seignorage} \rightarrow \text{High Inflation}$$

Weak institutional quality can influence output. An important component of aggregate output is investment which is highly sensitive to institutional quality (Barseghyan and DiCecio, 2010). Institutional quality can influence the responsiveness of the aggregate investment to the changes in the rate of interest. When an investor observes weak institutional quality – characterized by poor law and order, poor investment profile, corruption, government instability and poor bureaucratic quality – he puts off future investment plans. Ominous law and order situation is accompanied by strikes and non-availability of labor, hindering current production and future investment. Government instability can also play its part in investor's decision making; investment being a long term phenomenon, unstable government may create fear of loss among investors of policy reversals and expropriation of private property by the way of nationalization and freezing of accounts etc. Poor contract enforcement and unenforced property rights reflecting poor investment profile will also discourage investment[15]. Further, excessive red tape, captured by bureaucratic quality may also hinder investment. Low institutional quality is often supplemented by corruption

[15] Discussed at length in North (1990), Acemoglu (2002)

which increases the cost of investment. All these factors eventually lead to low investment and low output.

$$\text{Low IQ} \rightarrow \text{Low Investment} \rightarrow \text{Low Output}$$

Given the foregoing discussion, we incorporate the institutional quality in the reaction function. The modified reaction function is given by:

$$i_t = \psi(\pi_t, x_t, IQ_t) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.5)$$

Where $IQ_t$ is the variable representing the institutional quality.

**3.5 Institutional Quality and Interest Rate Channel of Monetary Policy:**

It is crucial for effectiveness of monetary policy to know how changes in the key monetary policy rate are transmitted to long term interest rates and how bank lending and deposit rates are affected by such changes (Egert and MacDonald, 2006). The traditional interest rate channel is presented in the following schematic:

$$i \Longrightarrow i_L \Longrightarrow \frac{I}{C} \Longrightarrow AD \Longrightarrow \pi$$

Where i is the policy rate of interest, $i_L$ is the lending rate, I is investment, C shows consumption, AD shows the aggregate demand and $\pi$ is inflation.

The aggregate investment and consumption are influenced by the long term real interest rate while monetary authority uses the short term nominal rate of interest to influence output and inflation. The essential link between short term real interest rate and long term real interest rate is provided by theories of term structure; including liquidity preference theory[16] and expectation hypothesis. The expectations hypothesis holds that long term interest rate are obtained as an average of expected short term

[16] First introduced by Keynes (1936)

interest rates. Another actor in the monetary transmission mechanism is how the monetary policy induced changes in money and capital market influence interest rates on bank deposits and loans. This link is provided by the marginal cost pricing model, where banks set interest rate in line with the marginal cost of funding approximated by the market interest rate and a constant markup. In this case the pass through of monetary policy action is complete under perfect competition and complete information. Incomplete pass through may arise due to imperfect competition in financial sector, presence of information asymmetry, high adjustment/menu costs, existence of long term relations of banks with customers, and volatile macroeconomic conditions[17].

All these problems relating to the incomplete pass through may be linked to the underlying institutional quality of the country. Low institutional quality is often associated with information asymmetry, imperfect markets and monopolies. Better institutional quality allows complete information to all agents, translating into lower menu costs or transaction costs, leading to perfect markets (North, 1990).

The following schematic summarizes the interest rate channel of monetary policy in case of low institutional quality:

$$i \downarrow \underbrace{\Longrightarrow i_L \downarrow_{(\text{low pass throuh})} \Longrightarrow \begin{matrix} I \updownarrow \\ C \updownarrow \end{matrix}}_{\boxed{\text{Low } IQ_t}} \Longrightarrow AD \updownarrow \Longrightarrow \pi \updownarrow$$

The above schematic shows that when policy rate is changed, the response variables do not behave in the expected way. Under incomplete and slow pass through of policy rate, the bank lending rate will not react in an optimal way and investment will be partially elastic to interest rate changes. Khwaja and Khan (2008) show that changes

[17] For a comprehensive review on interest rate pass through see for example Egert and MacDonald (2006)

in policy rates are passed on onwards with sufficient lag and that the pass-through is incomplete.

To conclude, the effectiveness of the interest rate channel of monetary policy is determined, among other things, by the institutional quality. In the first round institutional quality influence the pass-through of policy rates to market rates and in second round it affects the sensitivity of investment to changes in the interest rate.

### 3.6 Expected Signs of The Variables in The Model:

The nature of expected relationship of the policy interest rate with the explanatory variables and the rationale of such relationship is discussed below

Table 3.1: Expected Sign of Variables

| **Variable** | **Expected Sign of Coefficient** |
|---|---|
| Inflation | Positive |
| Output Gap | Positive |
| Institutional Quality | Positive / Negative |

A vast body of research in monetary policy has established that for monetary policy to be effective there should be a positive relationship between the rate of interest and inflation (Claridaet *al.*, 1999). The primary objective of monetary policy is to bring price stability by containing inflation[18]. When the central bank wants to contain inflation, it increases the policy rate of interest which raises the rate on Treasury bills, which is a risk free security. This raises the opportunity cost for banks to lend to firms. Now the credit will become costlier for firms, firms will borrow less, invest less and employ fewer workers thereby reducing production. On the other hand, it becomes attractive for the agents to save rather than invest. This will cut down demand, thereby reducing pressure on prices.

[18] See for example Barro and Gordon (1983), Svensson (1996), Clarida *et al.* (1999) etc

Theoretically, there is an inverse relationship between the rate of interest and output. The Taylor rule (1993) suggests a positive relationship between output gap and policy rate of interest. Assuming that the actual output is above the potential level, increasing the rate of interest decreases consumption as well as investment in the economy leading to decrease in output. This implies that the coefficient of output gap should bear a positive sign for the monetary policy to be effective. This also suggests that when the actual output is below the potential level than the rate of interest should be decreased to accommodate and stimulate aggregate demand to help restore it to the full employment level. Taylor (1993) suggested that the coefficient of inflation and output gap be greater than zero for a stable relationship –if the sign of inflation coefficient is negative then with the increase in inflation, interest rate decreases, leading to an unstable solution. Clarida *et al.* (1999) suggests that the coefficient of inflation should be greater than one and the coefficient of output gap should lie between zero and one for a stable solution. They argue that the increase in the policy rate should be of sufficient magnitude to induce changes in the real interest rate.

The relationship between the institutional quality and rate of interest is quite complicated. This relationship may be characterized by the following possible channels. Weak institutions often encourage corruption. Bureaucratic corruption may lead to lower revenues through formal taxes. The government may respond to this problem by increasing seignorage leading to higher inflation. To curb the inflation thus generated, the central bank will be forced to increase the rate of interest translating into a negative relationship between institutional quality and interest rates (Huang and Wei, 2006).

Martinez (2010) argues that better institutional quality may translate into reduced transaction cost, symmetric information, low monitoring cost on part of firms,

reduced lending risk like moral hazards and adverse selection. Better institutions may decrease information asymmetry thereby reducing the probability of adverse selection. The risk of default on bank loans increases partly due to moral hazards; that is, if a person "x" does not repay and does not incur any penalty for default then this may serve as an incentive for "y" to default. A rational lender (bank) will recoup its losses by spreading the losses due to default evenly across all the borrowers (good and bad) by increasing the cost of borrowing (rate of interest). However, if quality of institutions is high, reflected by better contract enforcement and rule of law, then each individual gets a penalty for default on loan decreasing the probability of moral hazards. This also implies a negative relationship between the institutional quality and the rate of interest.

Better institutions; characterized by secure property rights, better contract enforcement, rule of law, bureaucratic quality, low corruption etc, will attract foreign investment, FDI as well as portfolio investment, leading to abundance of funds in the economy. The consequent decrease in demand for domestic credit will lead to a negative relationship between the institutional quality and rate of interest.

Lower institutional quality may lead to the fiscal dominance. Countries with low institutional quality have central banks which lack independence and are often forced to pursue targets based on fiscal needs rather than monetary considerations. When there is high inflation and the government has little formal revenue generating sources then it borrows from the central bank to cover the fiscal deficit. Monetary policy reacts to this forced expansionary policy by increasing the rate of interest to counter the inflation generated due to the forced expansion. This also shows a negative relationship between institutional quality and rate of interest.

All the channels discussed above demonstrate a negative relationship between interest rate and institutional quality however one possible channel advocates a positive relationship between institutional quality and interest rate. It is believed that improvement in institutional quality can improve the marginal productivity of capital. In traditional economic theory, interest rate is set according to the marginal product of the capital (Clarida *et al.* 1999). With improvement in institutional quality, the marginal productivity of capital increases thereby increasing the cost of capital, i.e. the rate of interest. This suggests a positive relationship between the rate of interest and the institutional quality contrary to the relationship discussed above (Martinez, 2010).

In light of the forgoing discussion, it can be argued that the relationship between the rate of interest and institutional quality is rather ambiguous. It can either be positive or negative depending upon which channel is more effective – marginal productivity channel or other channels discussed above.

# Chapter 4: Monetary policy management in Pakistan:

This chapter reviews the major developments in financial system and monetary management during the period under consideration[19].The time span of the study is 1984 to 2011. During this period the overall financial system and monetary management underwent major changes. In this backdrop, it is desirable to take a brief detour and highlight the major changes. The principle change that occurred during the period was the liberalization of the financial regime. Accordingly the central bank moved from a controlled quantitative based monetary policy to market based monetary policy. The key features of financial liberalization with particular focus on changes in monetary regime are highlighted below. To put things in perspective; the main features of the pre reform period are also presented.

### 4.1 Pre-Reform (1984 – 1990):

The pre–reforms period is characterized by dominance of the financial sector by nationalized banks[20], oligopolistic banking sector, repressive interest rate structure, administrative management of monetary policy, severely limited autonomy of SBP, credit rationing, and underdeveloped capital markets. Some of the features of this era are summarized in table 4.1.

[19] This section is based on SBP annual reports (various editions), Hanif (2003), Janjua (2004), Islam (2009), Qayyum and Malik (2007), Khan and Khan (2007).
[20] Banking industry was nationalized in 1974

Table 4.1: Pre-Reforms Period Problems

| | |
|---|---|
| Banking Industry | ➢ Lack of competition.<br>➢ Barriers to entry.<br>➢ Market segmentation.<br>➢ Credit rationing.<br>➢ Political / bureaucratic interference.<br>➢ Labor unions.<br>➢ Overstaffing.<br>➢ Poor disclosure and auditing.<br>➢ High intermediating cost.<br>➢ loss incurring branches.<br>➢ Poor governance.<br>➢ Low efficiency. |
| Interest Rate Structure | ➢ Rigid interest rate structure.<br>➢ Set administratively.<br>➢ Non-existent yield curve.<br>➢ Caps on lending and deposits rates. |
| Monetary Policy | ➢ Use of direct instruments i.e. Credit ceiling, Reserve Ratio, Statuary liquidity requirements.<br>➢ lending to preferred sector.<br>➢ Non-existence of secondary market for government debt.<br>➢ Fiscal dominance.<br>➢ Set to meet the targets included in the Annual Credit Plan. |
| State Bank of Pakistan (SBP) | ➢ Lack of operational autonomy.<br>➢ Lack of skilled human resource.<br>➢ Limited regulatory authority.<br>➢ Multiplicity of regulators (SBP, CLA, PBC)[21]. |
| Other problems | ➢ Shallow capital market, low market capitalization, few firms listed at stock exchange, insider trading.<br>➢ Debt preferred over equity financing.<br>➢ Non-integration with world market.<br>➢ Poor legal framework for recovery of stuck-up loans.<br>➢ Government influence in the lending decisions of banks.<br>➢ Managed floating exchange rate regime. |

Source: SBP Annual Reports, Hanif (2003), Khan and Khan (2007)

In the pre-reform era, monetary transmission mainly worked through availability of credit as provided in Annual Credit Plan (ACP). Drawing the picture of the era, Janjua

[21] Pakistan Banking Council (PBC) was established in 1974 to oversee nationalize banks, Corporate Law Authority(CLA) regulated the capital market

(2004) notes "*Political and bureaucratic interference in the affairs of banks made the matter still worse. The multiplicity of regulatory authorities marginalized the role of SBP in management of financial sector. Totality of these developments, adversely effected the profitability in balance sheet of banks, led to increase in the volume of overdue of loans, segmented the credit markets, discouraged deposit mobilization, created financial repression prompted corrupt practices, encouraged concealing of facts and dubious accounting practices as well as distortion of monetary data." [Janjua (2004), pp-58]*. Moreover, SBP enjoyed a very limited autonomy during this time in formulating policies and financial matters. Non-availability of tools like OMO, Discount rate, required reserve ratio and limited control of SBP on the financial system further aggravated the problems. Moreover, in an environment of controlled subsidies and prohibition, SBP did not actively used interest rates as an instrument of monetary policy and largely relied on quantitative measures. This scenario called for a thorough reform in the whole financial sector and the conduct of monetary policy.

**4.2 Era of Reforms (1990–1997):**

Efforts to overhaul the financial system were initiated in 1989 with the launch of broad based reform program on advice of International monetary fund (IMF) while the World Bank and Japanese government provided technical assistance and finance. The broad based reforms were targeted to achieve goals like strengthening the role of market forces, bringing competition in the financial sector and restructuring the nationalized banks, liberalization of interest rates, elimination of credit control by gradually eliminating directed and subsidized credit schemes, adoption of indirect instruments for monetary management, prudential regulations to discipline the

financial system (Khan and Khan, 2007). Table 4.2 summarizes the developments in this period.

Table 4.2: Financial Sector Developments (1992 – 1997)

| | |
|---|---|
| 1990 | ➢ Banks (nationalization) Act (1974) amended permitting establishment of new banks<br>➢ System of Primary Dealers for Government Securities introduced |
| 1991 | ➢ Introduction of Government of Pakistan Treasury Bill (6 month Maturity) and Federal Investment Bond (1, 2, 3 years maturity)<br>➢ Permission granted for establishment of new banks<br>➢ Companies Ordinance (1962) amended to bring NBFIs under SBP jurisdiction<br>➢ Issuance of three months T-Bills and FIBs on-tap stopped |
| 1992 | ➢ Prudential regulations introduced<br>➢ Three day Repo facility introduced<br>➢ Credit Ceiling abolished and replaced by CDR<br>➢ Two nationalized banks privatized |
| 1994 | ➢ SBP Act (1954) amended to give autonomy to SBP<br>➢ Monetary and Fiscal policy coordination board established<br>➢ Share of direct subsidized credit decreased and the practice of issuance of directives to lend to specific sector stopped. |
| 1995 | ➢ Auction of T-Bills fully integrated with OMO<br>➢ Monetary policy entirely conducted through OMO<br>➢ Cap on interest rate abolished<br>➢ Prudential Regulations refined<br>➢ Policy of setting Credit to Deposit Ratio abolished |
| 1997 | ➢ Pakistan Banking Council abolished<br>➢ SBP granted full operational autonomy over conduct of monetary policy<br>➢ Banking companies (Recovery of loans, Advances, Credit and Finance) Act 1997 promulgated |

The government was successful in establishing market for government debt. This was a move towards flexible market based monetary management from rigid quantitative controls. To make banking sector competitive, new banks were allowed to enter the

business. The banking sector provided very low real returns which lead to low private investment and traditional system was unable to encourage savings (Khan and Khan 2007). To increase the competitiveness of the banking sector, privatization was also pursued to improve governance structure and reduce inefficiency, prudential regulations were also introduced to protect the consumer and bring transparency. State bank was given full operational autonomy over the conduct of monetary policy. Interest rates were liberalized; credit ceiling was abolished and replaced by Credit to Deposit Ratio which was also abolished later on. Lending to preferred sector was abolished and the share of concessionary and mandatory credit to private sector were reduced.

**4.3 Post Reforms (1998 – 2011):**

The post reform period is characterized by expansion of the financial sector. Monetary policy became more effective and state bank played an active role in the regulation and management of the financial sector. The liberalized structure of interest rates gave rise to an entirely new market for investment. Secondary market for government debt became fully functional and state bank used policy tools which it had lost in the previous years. Transmission mechanism was substantially improved. Table 5.3 summarizes the developments of post reform period developments.

Table 4.3: Financial Sector Developments (1998 – 2011)

| | |
|---|---|
| 1998 | ➢ Minimum Lending Rates abolished<br>➢ Banks start charging market rate of interest on loans and advances<br>➢ All margin requirements for opening of letter of credit were removed |
| 2000 | ➢ Managed float exchange rate abolished and replaced by floating exchange rate<br>➢ SBP Restructured; monetary management segregated from banking operations and supervision |
| 2001 | ➢ Improvement in prudential regulations |

Table 4.3: Financial Sector Developments (1998 – 2011) Contd…

| | |
|---|---|
| 2003 | ➢ Innovations in financial system i.e. ATM, Credit/Debit cards. online banking (Plastic money) |
| 2005 | ➢ Fiscal Responsibility and Debt Limitation Act (2005) |
| 2006 | ➢ Separate reserve requirement on demand deposits and time deposits |
| 2007 | ➢ Issuance of annual credit plane (ACP) stopped<br>➢ Government issued 30 years long term bond |
| 2009 | ➢ Changes in framework of primary auction<br>1. Cut off rates set by ministry of finance<br>2. Auction decision on target volumes instead of cut off rates<br>3. Pre-announcement of auction volume |
| 2010 | ➢ Key changes in monetary policy committee<br>1. Now includes 2 external experts, this entails to greater transparency<br>2. Minutes of Monetary Policy Committee meetings are disclosed with a lag of two months<br>➢ Increase in frequency of monetary policy statements, increased from 4 to 6 per year<br>➢ SBP setup interest rate corridors<br>➢ Launch of Govt. of Pakistan Ijara Sukuk (1,2, 3 years maturity) |

Source: SBP Annual Reports

Despite these developments in the financial sector, this period also witnessed some major sociopolitical changes which have affected the financial sector. In May 1998, Pakistan became the sixth nuclear power. International community imposed sanctions on Pakistan and foreign aid was suspended. In wake of these developments, SBP introduced two tire exchange rates system. It also freezed foreign currency accounts to bar capital flight. Later on, some restrictions were relaxed and managed float was reintroduced followed by free float exchange rate regime.

Another major shift occurred after 9/11. Pakistan became a major ally in the war on terror. Pakistan witnessed a surge in remittances, rescheduling of foreign debt, resumption of IMF and World Bank aid programs and received huge sums under coalition support fund.

Khan and Khan (2007) argue that financial reforms have been successful and another second generation reforms are needed. Hanif (2003) also argues that financial reforms are an ongoing process and should be pursued continuously according to the needs of the economy and advancement in technology. Overall, the era has seen a shift from administrative based monetary policy to market based monetary policy management coupled with liberalization of the banking industry and interest rate structure. Further, the domestic economy is now more integrated with the international economy and the reforms have caused exponential growth in the financial sector.

# Chapter 5: Empirical Model, Data and Variables

In this chapter, we discuss the empirical technique used for estimation and testing of our hypothesis. The data, its sources and construction of variables where required are also discussed. Our data is time series in nature and the data span is 1984 – 2011.

## 5.1 Empirical Strategy:

We use the Autoregressive Distributive Lag (ARDL) method for estimation of our model. The reasons for using this model are manifold. First, we suspect that the variables used in the analysis are integrated, potentially of different order of integration. If the data series are integrated then traditional estimation techniques cannot be used, unless the series are made stationary or exhibit cointegration. Second, if the variables are integrated of different order then the traditional cointegration methods like Engel Granger (1987) and Johansen (1991,1995) cointegration techniques are not applicable because the basic assumption for both of these techniques is that the series used should have the same order of integration. Third, as pointed out by Ruth (2004) and others[22], Taylor rule can be better characterized by accounting for the interest rate smoothening. This can be done in a cointegration framework using the error correction term. Fourth, having a small sample we cannot use the traditional cointegration techniques as their explanatory power depends upon the sample size. The ARDL method can also deal efficiently with small sample without producing biased result. Fifth, ARDL inherently takes into consideration the problem of endogeneity and autocorrelation. Taking into consideration all the above mentioned benefits of ARDL, we consider it the appropriate technique for estimating our model. The ARDL estimation technique is described below.

[22] For example Judd and Rudebusch (1998), Gerlach-Kristen (2003)

### 5.1.1 ARDL Method to Cointegration:

In our case, the general form of the ARDL equation can be written as follows:

$$\Delta i_t = \alpha_0 + \alpha_1 T + \beta_1 i_{t-1} + \beta_2 Gap_{t-1} + \beta_3 inf_{t-1} + \beta_4 IQ_{t-1} + \sum_{i=1}^{p} \gamma_i \Delta i_{t-i} + \sum_{i=0}^{p} \theta_i \Delta Gap_{t-i} + \sum_{i=0}^{p} \varphi_i \Delta infl_{t-i} + \sum_{i=0}^{p} \delta_i \Delta IQ_{t-i} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5.7)$$

Where$i = 1,2,3$ ..., $\alpha_0$is the intercept,$T$is the trend, $c_0, \alpha, \beta_1, \beta_2, \theta, \gamma$ are parameters.$i$ is the interest rate, $Gap$ is the output gap, $inf$is the inflation,$IQ$is the institutional quality index and$\Delta$ is the difference operator i.e. $\Delta y_t = y_t - y_{t-1}$. In this equation, the variables at levels define the long run relationship and variables in difference form define the short run dynamics. The maximum lag will be set to three years and final model will be selected on basis of Schwarz Bayesian Criterion (SBC) as Pesaran *et al.* (2001) suggests that SBC yields superior results over Akaik Information Criterion (AIC).After selecting the best model based on SBC, we test for the existence of cointegration using Bound test proposed by Pesaran *et al.* (2001).

### 5.1.2 Cointegration Test:

The Bound testing procedure in ARDL is used to test for existence of cointegration in the model. One of the advantages of the ARDL approach, as mentioned earlier, is that in this procedure we don't need to know the order of integration of the underlying variables. These variables may be I(0), I(1)[23]or partially integrated. In bound testing procedure, two sets of asymptotic critical values are provided for the two extreme cases, i.e. I(0) and I(1). These two sets of critical values formulate a bound. If the

[23] I(0) (integrated of order zero) means the variable is stationary at level while I(1) (integrated of order one) shows the variable is differenced stationary.

computed Wald or F-statistics fall outside these bounds then this confirms that there exists a cointegrating relationship among the variables of the model. However, if the Wald or F-statistics falls inside the bounds then the test is inconclusive. The critical values of these bounds are drawn from Pesaran *et al.* (2001).The bound testing can be carried out for equation 5.7 by testing the following hypothesis:

$$H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = 0 \dots\dots\dots\dots\dots\dots\dots\dots (5.8)$$

If $H_0$ is rejected then we conclude that there is a long run relationship among the variables. According to Pesaran (1999)the asymptotic distribution of the F-Statistics are non standard regardless of the degree of integration of the variables when the null hypothesis is of no cointegration. This depends upon whether the variables included in the ARDL model are I(0) or I(1), the number of regressors, whether the ARDL model contains an intercept and/or a trend, and the sample size. Two sets of critical F-values, representing the lower bound and the upper bound, have been suggested by Pesaran *et al.* (2001). If the statistic is higher than the upper bound, the null hypothesis of no cointegration can be rejected and the next step is to estimate the ARDL based ECM where the short-run and long-run elasticity's may be determined.

### 5.1.3 Long Run Relationship:

After confirmation of existence of long run relationship, long run coefficients from equation 5.7 can be extracted by normalizing the coefficients of the variables with respect to coefficient of dependent variable. In our case this will be done as follows.

$$\beta_1 i_{t-1} + \beta_2 Gap_{t-1} + \beta_3 inf_{t-1} + \beta_4 IQ_{t-1} = 0 \dots\dots\dots\dots\dots\dots\dots\dots (5.9)$$

$$\beta_1 i_{t-1} = -\beta_2 Gap_{t-1} - \beta_3 inf_{t-1} - \beta_4 IQ_{t-1}$$

$$i_{t-1} = -\frac{\beta_2}{\beta_1} Gap_{t-1} - \frac{\beta_3}{\beta_1} inf_{t-1} - \frac{\beta_4}{\beta_1} IQ_{t-1}$$

$$i_{t-1} = \theta_1 Gap_{t-1} + \theta_2 inf_{t-1} + \theta_3 IQ_{t-1} \dots\dots\dots\dots\dots\dots\dots\dots (5.10)$$

Where $\theta_1 = -\frac{\beta_2}{\beta_1}$, $\theta_2 = -\frac{\beta_3}{\beta_1}$, and $\theta_3 = -\frac{\beta_4}{\beta_1}$ are the long run coefficients.

### 5.1.4 Dynamic Short Run Relationship and Error Correction:

The dynamic short run relationship of equation 5.7 can be generated by replacing the long run equation 5.9 by the error correction term. The final dynamic short run equation with error correction can be can be specified as follows:

$$\Delta i_t = \alpha_0 + \alpha_1 T + \emptyset ECM_{t-1} + \sum_{i=1}^{p} \gamma_i \Delta i_{t-i} + \sum_{i=0}^{p} \theta_i \Delta Gap_{t-i} + \sum_{i=0}^{p} \varphi_i \Delta inf_{t-i} + \sum_{i=0}^{p} \delta_i \Delta IQ_{t-i} + \varepsilon_t \dots\dots\dots\dots\dots\dots\dots\dots (5.11)$$

The coefficient of error correction term $(ECM_{t-1})$ $\emptyset$ represents the speed of adjustment. It tells us the magnitude of the error correction accounted for in the current period.

## 5.2 Data, Variable Definition and Construction:

In this subsection, we define the variables which will be used to estimate our empirical model and present their respective sources.

### 5.2.1 Data Span:

We have used annual time series data from 1984 to 2011 for Pakistan. The monetary changes influence economic variables in the short run; therefore it is preferable to use data on monthly or quarterly frequencies. Though the data on monetary variables is available at shorter frequencies however the data on institutional quality is available only on annual frequency. Moreover, it is not desirable to use high frequency

institutional data as institutions evolve only over time. As the focus of this study is on the impact of institutions on monetary policy, therefore we use annual frequency data.

### 5.2.2 Output Gap:

Output Gap is defined as the difference between the actual output produced within the economy and the potential or long run output which could be produced when there are no frictions and the economy is operating at the full employment level. The commonly used measure for measure of output is the nominal GDP. To find the output gap, we need the potential or natural rate of output of the economy under consideration. Though it cannot be observed directly, nevertheless statistical techniques are available to estimate it. One of the techniques widely used is the Hodrick – Prescott (HP) Filter.

Hodrick – Prescott filter uses the following procedure to draw the long run trend component of the series. Assuming $y_t$ is the series for which we want to extract the long run trend component, the equation for the HP filter can be written as follows

$$\sum_{t=1}^{T}(y_t - s_t)^2 + \lambda \sum_{t=2}^{T-1}((s_{t+1} - s_t)^2 - (s_t - s_{t-1})^2) \dots\dots\dots\dots\dots\dots\dots\dots (5.1)$$

Where s is the smoothed series or longrun series of $y_t$, derived by minimizing the variance of $y_t$ around $s_t$. $\lambda$ is the smoothness parameter and it controls the smoothness of the series. For annual series $\lambda$ is generally taken as 100.

Data on output is drawn from the International Financial Statistics (IFS).To minimize the variance of the data and to make the data comparable with other series, we have used logarithm of GDP before estimating output gap, using HP Filter.

### 5.2.3 Inflation:

To capture the aggregate level of prices, we have used GDP deflator. Inflation is computed as:

$$\text{Inflation} = \pi_t = \log(\text{GDP Deflator}_t) - \log(\text{GDP Deflator}_{t-1}) \dots \dots \dots (5.2)$$

Where subscriptt shows the current period and $t-1$shows the previous period. Data for GDP Deflator is also drawn from the International Financial Statistics (IFS).

### 5.2.4 Rate of Interest:

The policy interest rate indicates the stance of monetary policy. Common measures include Discount Rate, Call Money Rate, Treasury Bill (T-Bill) rate, Kibor, and Yield on Government Bonds etc. The discount rate reflects the policy rate however in Pakistan the discount rate does not show any variability prior to 1992 because interest rate was not being used as a monetary policy tool before 1992. The closest proxy for measuring market based interest rate is the T-Bill Rate. The data on T-Bill is again available only since 1992 due to non auction of the treasury bills before that. Given these limitations, we have used the call money rate to capture the stance of monetary policy. Call money rate is also strongly correlated with the T-Bill rate during the time period for which T-Bill rate is available. This implies that call money rate is a good proxy of the T-Bill rate and hence of the policy rate. Table 5.1 summarizes the correlation between discount rate, T-Bill rate and call money rate.

Table 5.1: Ordinary Correlation

| Sample: 1992 -2011 | | | |
|---|---|---|---|
| Correlation | Discount Rate | T-Bill Rate | Call Money Rate |
| Discount Rate | 1.00 | | |
| T-Bill Rate | 0.74 | 1.00 | |
| Call Money Rate | 0.71 | 0.90 | 1.00 |

The table clearly shows that there is a high correlation between call money rate and discount rate as well as T-Bill rate. Data for call money rate is drawn from IFS.

### 5.2.5 Institutional Quality[24]:

The most widely used measure of institutional quality comes from the international country risk guide (ICRG) dataset compiled by experts at Political Risk Services (PSR) Group. ICRG Political dataset consist of 12 categories i.e. Government Stability, Socioeconomic Conditions, Investment Profile, Internal Conflict, External Conflict, Corruption, Military in Politics, Religious Tensions, Law and Order, Ethnic Tensions, Democratic Accountability and Bureaucracy Quality. We have selected six indicators from ICRG data set for our analysis because these host the potential to influence monetary policy in one or the other way. The rationale for using these variables is discussed below.

#### 5.2.5.1 Government Stability (max 12 Points):

Government stability is the ability of the incumbent government to complete the legal tenure in power as enshrined in the constitution. Being in power for the planned period ensures fulfillment of the promises and completion of developmental projects. It comprises of three sub categories i.e. Government Unity, Legislative Strength and Popular Support.

[24] Definition of the components of institutional quality are from ICRG methodology document available at http://www.prsgroup.com/PDFS/icrgmethodology.pdf

Unstable government may cause uncertainty about the future course of economic policies, hindering investment and flow of FDI and inducing volatility in output[25]. As one of the objectives of monetary policy is to bring output stability, so monetary policy will react to ensure output stability. The politicians, given this kind of uncertainty, may indulge in rent seeking and tax evasion thereby shrinking government's sources of income. The government would find it difficult to cover expenditure against formal revenue generating sources. This would force the central bank to print money. The seignorage will in turn increase inflation, forcing the monetary authority to respond. Unstable governments may also be reluctant to grant autonomy to the monetary authority. It is now well established that weak central banks are unable to pursue good policies so it will also affect the monetary policy.

**5.2.5.2 Investment Profile (max 12 Points):**

Investment Profile comprises of factors that affect investment in the country. Sub categories include: Contract Viability/Expropriation, Profits Repatriation and Payment Delays which enjoy equal weights.

Investment Profile reflects the underlying conditions conducive for private investment. Monetary policy affects the real economy in short run through investment. Rational investors take into consideration, beside other things, the factors described under investment profile when making investment decisions. If an investor faces the probability of confiscation of property or harassment by expropriation and payment delays then he will be insensitive to the changes in the interest rate which is considered to be the primary mediating channel for investment. This will lead to lower investment. This will result in the ineffectiveness of monetary policy.

[25] See for detailed discussion for example Carmignani (2003).

#### 5.2.5.3 Corruption (max 6 Points):

Corruption may lead to lower collection of revenues generated through formal taxes. Government may respond to this problem by increasing seignorage leading to higher inflation. To curb inflation thus generated, the central bank will be forced to react to ensure price stability (Huang and Wie 2006).

#### 5.2.5.4 Law and Order (max 6 Points):

Laws are the formal institutions legislated in the best interest of the masses. The ability of the government to execute these laws is defined by order.

Poor law and order situation hinders investment. It constrains the economic development and generates unemployment as firms do not invest and businesses begin to shut down. To boost investment, monetary authority adopts an accommodative stance.

#### 5.2.5.5 Bureaucratic Quality (max 4 Points):

Bureaucratic quality reflects the ability of the system to persist minimizing revision of policies when governments change. Low bureaucratic quality shows excessive red tape and hinders investment. Poor bureaucratic quality affects the monetary policy in the manner discussed in case of government stability and corruption under section 5.2.5.1 and 5.2.5.3.

#### 5.2.5.6 Democratic Accountability (max 6 Points):

This is a measure of how responsive government is to its people. Democratic accountability is measured by the type of governance structure prevailing in the country. Democratic accountability is closely linked with corruption and law and

order. It can affect monetary policy in manner discussed under section 5.2.5.3 and 5.2.5.4.

### 5.3 Principle Component Analysis:

Principle Component Analysis (PCA) is a variable deducting method[26]. As the foregoing discussion suggest institutional quality measures seem to be interrelated and may have high correlation leading to multicolinearity, so we need to combine all these variables into an index to capture these institutional characteristics together.

Principle component analysis (PCA) is used to reduce the dimensionality of a large dataset containing many interrelated variables into a smaller number of representative, uncorrelated (orthogonal), variables with minimum loss of information. The new set of variables is generated by transforming the raw data into a new set of variables called the principle components (PCs). Each PC is the linear combination of the original variables which are ordered in such a way that the first few PCs retain most of the variation presented by the original variables (Jolliffe, 2002). As the few initial PCs retain most of the information and explain maximum variability in the dataset, PCs which explain more than 60% of the variability in the composite index are retained as a rule of thumb (Bishoi *et al.* (2009).This is also equivalent to retaining the components which have eigen values greater than one. PCs with eigen value less than one are ignored as their associated vectors explain negligible variation in the composite index and are therefore treated as noise.

We use the normalized data from ICRG dataset to compute composite index of institutional quality using PCA. As in PCA, each variable can be written as linear combination of PCs, in our case this can be done using following formula as:

[26] Principal component analysis is based on the frame work used by Bishoi *et al.* (2009)

$$X_j = \sum_{i=1}^{n} a_{ji} P_i , \qquad (j = 1, 2, \dots, n) \dots\dots\dots\dots\dots\dots\dots\dots (5.4)$$

Where, $X_j$ is the variable under consideration, $P_i$ is the $i^{th}$ principal component; $a_{ji}$ is the factor loading of the $j^{th}$ variable on the $i^{th}$ principal component. The principal components are given by:

$$p_i = \sum_{j=0}^{n} \frac{a_{ji} X_j}{\lambda_i} \dots\dots\dots\dots\dots\dots\dots\dots (5.5)$$

Where $\lambda_i$ is the eigen-value associated with the principle component $P_i$. The composite index of institutional quality can be generated using the principal components generated by equation 5.5 using the following formula as:

$$IQ = \frac{\sum_{i=1}^{n} (p_i E_i)}{\sum_{i=1}^{n} E_i} \dots\dots\dots\dots\dots\dots\dots\dots (5.6)$$

Where, $E_i$ are the eigen-values and $IQ$ is the index of institutional quality. Using annual data from ICRG dataset, institutional quality index is constructed by PCA. We have retained components with eigen-value $\geq$ 1.0, identified using scree plots, and which account for more than 60 % of variance in the composite index.

**5.4 Test of Stationarity:**

It is generally believed that time series data often contain unit roots and without taking into consideration the unit roots, the regression results may be spurious. Number of tests have been proposed to investigate the existence of unit roots. These include ADF, PP, KPSS etc. with varying power and size. Though, the ARDL

method doesn't require to test for the order of integration of the data series as mentioned earlier but Ouattara (2006) argues that F-statistics for bounds test provided by Pesaran *et al.* (2001) remains valid if and only if the variables used in the model are either I(0) or I(1) – any data series in the model should not be integrated of higher order. We employ the Augmented Dickey Fuller and Phillips-Perron methods to test the order of integration of the data series.

# Chapter 6: Empirical Results

We report and interpret the estimation results in this chapter.

### 6.1 Descriptive Statistics:

Table 6.1 summarizes the Descriptive statistics of the variables used in the analysis.

Table 6.1: Descriptive Statistics

| Variable | Mean | Median | Max | Min | Std. Dev. | Jarque-Bera | Probability |
|---|---|---|---|---|---|---|---|
| Call Money Rate | 8.57 | 8.53 | 12.47 | 2.13 | 2.74 | 1.04 | 0.59 |
| Output Gap | -0.001 | -0.95 | 9.28 | -5.78 | 4.02 | 1.54 | 0.46 |
| Inflation | 3.73 | 3.50 | 8.03 | 1.06 | 1.69 | 1.23 | 0.53 |
| Institutional Quality | 45.14 | 43.23 | 77.33 | 13.37 | 17.33 | 0.91 | 0.64 |

Table 6.1 shows that all variable exhibit considerable fluctuation and the data is normally distributed.

### 6.2 Correlation and Graphs:

Table 6.2 shows the extent of correlation among the variables.

Table 6.2: Ordinary Correlation

| Correlation | Output Gap | Inflation | Institutional Quality | Call Money Rate |
|---|---|---|---|---|
| Output Gap | 1.00 | | | |
| Inflation | 0.24 | 1.00 | | |
| Institutional Quality | 0.23 | 0.22 | 1.00 | |
| Call Money Rate | 0.52 | 0.55 | 0.54 | 1.00 |

Table 6.2 shows high and positive correlation between call money rate and rest of the variables which is in accordance with the theory. The table also shows a weak positive correlation between institutional quality, output gap and inflation. It also shows a high correlation between inflation and output gap. This trend is also corroborated in the following graphs.

Figure 6.1 shows the movement in the interest rate and inflation. It shows a positive co-movement between these two variables. The figure shows that the GDP deflator exhibits considerable volatility over the sample period. Inflation is at its lowest in 2002 and it is at its highest in 2009.

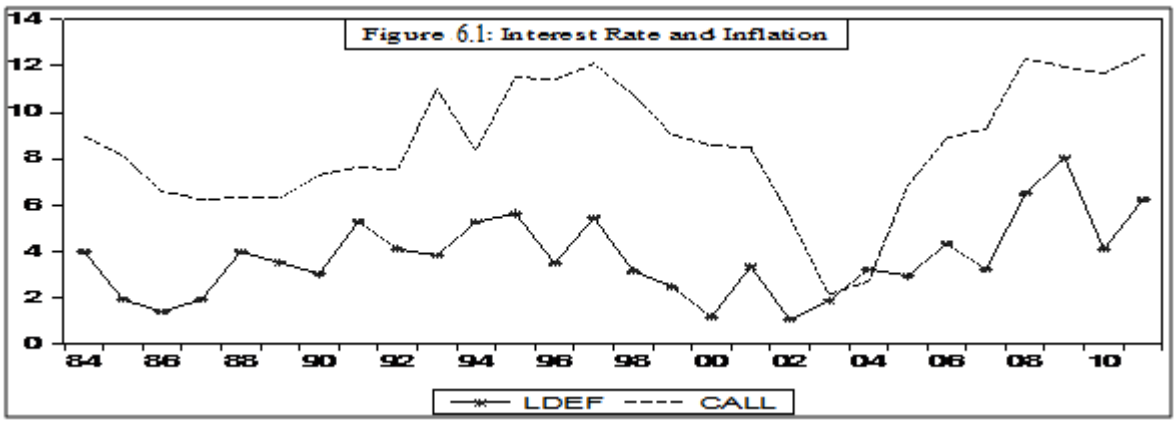



Figure 6.2 shows the movement of interest rate and output gap. The figure shows that output gap is at its lowest in 2003 and is at its highest in 2000.

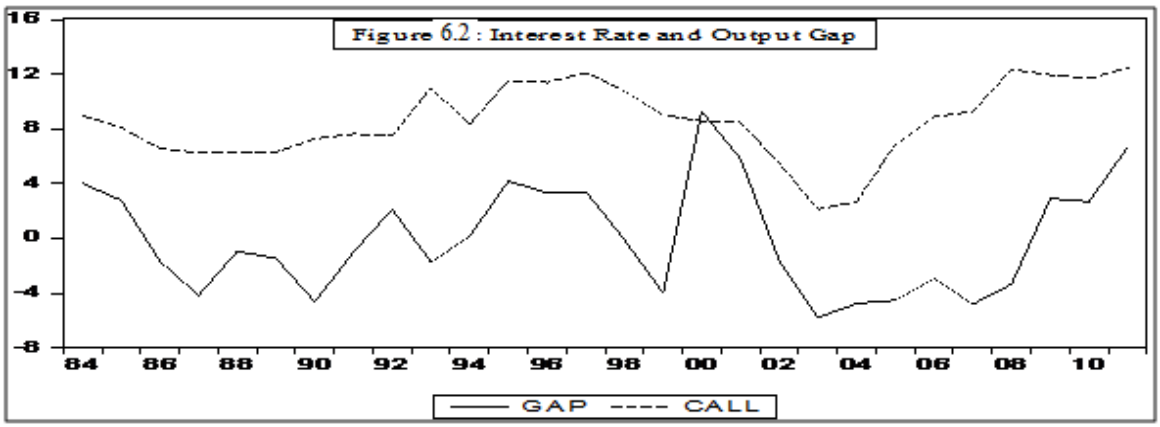
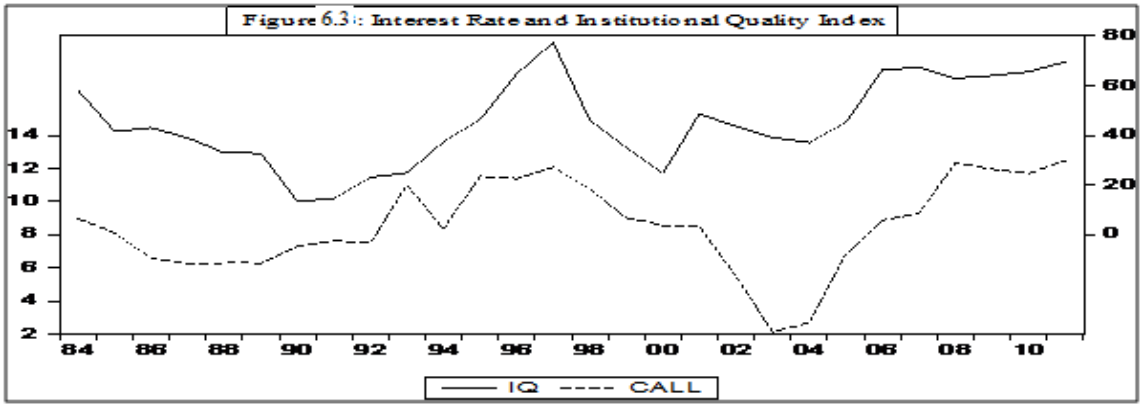



Figure 6.3 shows the movement of interest rate and institutional quality index. The two variables have moved together over time with some divergence in between. Institutional quality is at its highest in 1997 and is at its lowest in 1990.




## 6.3 Test of Stationarity:

Table 6.3 summarizes results of unit root test.

Table 6.3: Unit Root Tests

| ADF TEST | | | | | | | |
|---|---|---|---|---|---|---|---|
| | At Level | | | At First Difference | | | Order of Integration |
| Variable | No Intercept, No Trend | Intercept Only | Intercept, Trend | No Intercept, No Trend | Intercept Only | Intercept, Trend | |
| Call Money Rate | -0.09 | -1.50 | -1.71 | -4.68*** | -4.62*** | -4.06*** | I(1) |
| Output Gap | -3.01*** | -2.95* | -2.82 | -5.35*** | -5.25*** | -5.27*** | I(0) |
| Inflation | -0.15 | -2.87* | -3.12 | -7.83*** | -7.72*** | -5.56*** | I(0) |
| Institutional Quality | -0.40 | -1.68 | -5.40*** | -4.62*** | -4.55*** | -4.50*** | I(1) |
| PP TEST | | | | | | | |
| | At Level | | | At First Difference | | | Order of Integration |
| Variable | No Intercept, No Trend | Intercept Only | Intercept, Trend | No Intercept, No Trend | Intercept Only | Intercept, Trend | |
| Call Money Rate | -0.12 | -1.77 | -1.94 | -4.68*** | -4.62*** | -4.60*** | I(1) |
| Output Gap | -3.01*** | -2.95* | -2.75 | -7.18*** | -7.00*** | -7.98*** | I(0) |
| Inflation | -0.51 | -2.78* | -3.15 | -8.54*** | -9.36*** | -9.24*** | I(0) |
| Institutional Quality | -0.40 | -1.86 | -2.75 | -4.62*** | -4.55*** | -4.49*** | I(1) |

Note: ***,** and * shows significance at 1%, 5% and 10% respectively

Table 6.3 shows that call money rate and index of institutional quality are integrated of order one (non-stationary) while output gap and inflation, measured by GDP

deflator, are integrated of order zero (stationary) which is confirmed by both ADF and PP test.

As mentioned earlier, to use the ARDL model the underlying data series should at most be integrated of order one (difference stationary). Table 6.3 shows that the variables are either integrated of order zero or integrated of order one. Therefore, we can now safely proceed with estimation of our model, using the ARDL method.

### 6.4 Estimation Results:

We have used Schwartz Bayesian criterion for selection of our model. Table 6.4 presents results of the selected equation which will be tested for existence of the long run relationship.

Table 6. 4: Test Equation Results

| Dependent Variable: Call Money Rate | | | |
|---|---|---|---|
| Variables | | Coefficient | |
| Call Money Rate (-1) | | 0.29<br>(0.14) | |
| Output Gap | | -0.20<br>(0.11)** | |
| Output Gap (-1) | | 0.50<br>(0.15) * | |
| Output Gap (-2) | | -0.58<br>(0.11) *** | |
| Inflation | | 1.10<br>(0.25) *** | |
| Inflation (-1) | | -0.49<br>(0.28) * | |
| Inflation (-2) | | 0.51<br>(0.13) *** | |
| Institutional Quality | | -0.09<br>(0.05) * | |
| Institutional Quality (-1) | | 0.24<br>(0.06) *** | |
| Institutional Quality (-2) | | 0.06<br>(0.07) | |
| Institutional Quality (-3) | | -0.20<br>(0.05) *** | |
| Intercept | | 0.90<br>(1.54) | |
| R-Squared | 0.96 | S.E of Regression | 0.74 |
| Schwarz Bayesian Criterion | -39.07 | F-Stats [Prob.] | 31.80 [0.00] |
| Number of Observations: 28 | | | |

Note: values in parenthesis indicate Standard Error; ***,** and * shows significance at 1%, 5% and 10% respectively

The R-Square is 0.96 which indicates that the model has high explanatory power.

### 6.4.1 Cointegration Test:

We have used Bound Test to examine the existence of long run relationship. Table 6.5 summarizes Bound test results.

Table 6.5: Bound Test

| Computed F-Static | Lower Critical F-Static | Upper Critical F-Static | Result |
|---|---|---|---|
| 10.10783 | $5\% = 3.05$<br>$10\% = 2.68$ | $5\% = 3.968$<br>$10\% = 3.53$ | Cointegration |

The test results indicate that a cointegrating relationship exists among the variables as the computed F-statistics lies outside the inconclusive range and is greater than the upper critical bound.

### 6.5.2 Breusch-Godfrey Serial correlation LM test:

For the results to be valid there should be no autocorrelation in the residuals of the regression equation. Table 6.6 summarizes the results of Breusch-Godfrey Serial correlation LM test.

Table 6.6: Breusch-Godfrey Serial correlation LM test

| Lag | F-statistic | Chi-Square |
|---|---|---|
| 1 | 0.759<br>(0.401) | 1.488<br>(0.222) |
| 2 | 0.351<br>(0.711) | 1.501<br>(0.472) |
| 3 | 0.215<br>(0.884) | 1.516<br>(0.679) |

Note: values in parenthesis indicate probability

The test results indicate residuals of the regression do not exhibit serial correlation, up to 3 lags.

### 6.4.3 Ramsey RSET Test:

Ramsey RSET Test is used to examine whether the model is correctly specified. Table 6.7 presents results of Ramsey RSET Test:

Table 6.7: Ramsey RSET Test

| F-statistic | Value |
|---|---|
| | 0.0046 (0.94) |

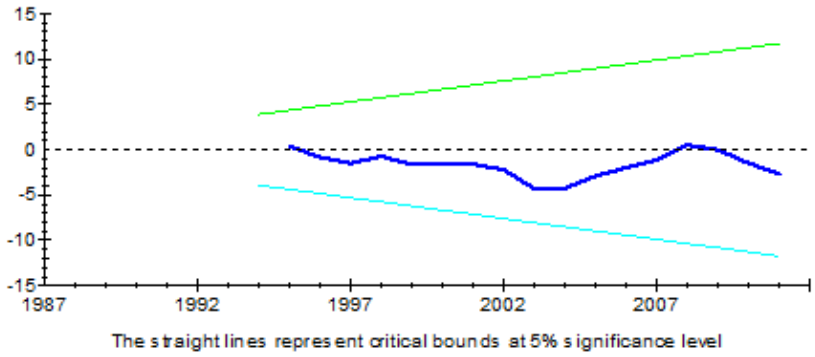
Note: values in parenthesis indicate probability

Test results indicate that the model has no specification error.

## 6.4.4 CUSUM and CUSUM Square Test:

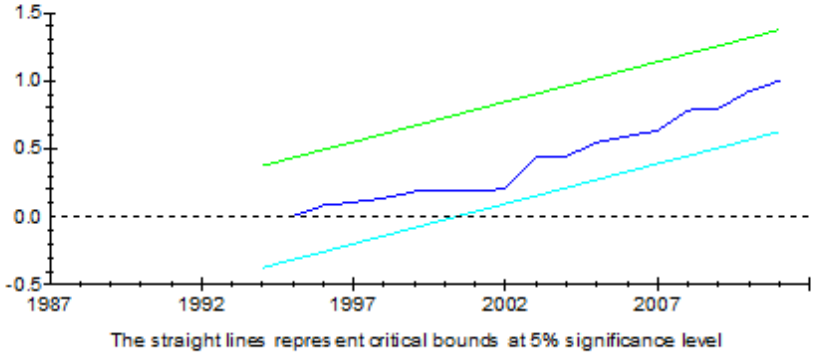
CUSUM and CUSUM Square tests are generally used to test for the stability of estimated parameters. If the model is stable then the estimated chart of the cumulative sums (CUSUM) will lie within the 5% significance band.

Figure 6.4: CUSUM Plot




CUSUM test shows that the parameters of our model lie within the 5% band and are therefore considered stable.

Figure 6.5: CUSUM Square Plot




CUSUM square test also suggests that the model parameters are stable over time. Now we can proceed to discuss the results of our model as the model has passed all the diagnostic tests.

## 6.5 Long Run Relationship:

Table 6.7 summarizes the long run relationship of interest rate with inflation, output gap and institutional quality.

Table 6.8: Long Run Relationship

| Dependent Variable: Call Money Rate | |
|---|---|
| Variable | Coefficient |
| Output Gap | -0.39<br>(0.16)*** |
| Inflation | 1.60<br>(0.35) *** |
| Institutional Quality | 0.01<br>(0.05) |
| Intercept | 1.27<br>(2.22) |

Note: values in parenthesis indicate standard error; ***, indicate significance at 1%,

The long run equation results suggest that the relationship between the institutional quality and the rate of interest is insignificant, though positive. This result indicates that in the long run, rate of interest does not respond to changes in institutional quality. Table 6.7 shows that there is a negative and highly significant relationship between rate of interest and output gap. This result indicates that when output gap increases, rate of interest is decreased by the monetary authority. This also shows that

the monetary policy is procyclical, often described as a problem faced by developing economies. This also shows that the monetary authority has not been following the policy of leaning against the wind. The relationship between inflation and interest rate is positive and highly significant and more than one for one in terms of magnitude. In the long run this relationship is in accordance with the Taylor rule.

## 6.5 Dynamic Short Run Relationship:

Table 6.8 summarizes the results of short run dynamic equation.

Table 6.9: Dynamic Relationship

| Dependent Variable: Δ Call Money Rate | | | |
|---|---|---|---|
| Variable | | Coefficient | |
| Δ Output Gap | | -0.20<br>(0.12) | |
| Δ Output Gap (-1) | | 0.58<br>(0.11) *** | |
| ΔInflation | | 1.10<br>(0.25) *** | |
| Δ Inflation (-1) | | -0.51<br>(0.13) *** | |
| Δ Institutional Quality | | -0.09<br>(0.05) * | |
| Δ Institutional Quality (-1) | | 0.15<br>(0.04) *** | |
| Δ Institutional Quality (-2) | | 0.20<br>(0.05) *** | |
| Δ Intercept | | 0.90<br>(1.54) | |
| ecm(-1) | | -0.71<br>(0.14) *** | |
| R-Squared | 0.91 | S.E of Regression | 0.74 |
| Schwarz Bayesian Criterion | -39.07 | F-Stats [Prob.] | 18.15<br>[0.00] |

Note: values in parenthesis indicate S.E ; ***, * indicate significance at 1% and 10% respectively

High R-Square value suggests that the model has a high explanatory power. Table 6.8 shows that institutional quality effects interest rate for sufficiently longer period. Contemporaneous impact of institutional quality on interest rate is negative but is positive in the next two periods. This does not yield a clear picture regarding the

nature of relationship between institutional quality and interest rate. The results further indicate that there is a positive relationship between the rate of interest and inflation in the contemporaneous period but there is a negative relationship between these two variables at a year lag. This means that initially the monetary authority reacts to the change in inflation by increasing the rate of interest but down the road this relationship turns around. In the current period, changes in output gap do not affect interest rate as the coefficient of output gap is insignificant. However, the interest rate reacts positively to changes in the output gap at a year's lag.

The coefficient of error correction term indicates that three fourth of the error is accounted for in the current period. This shows that the central bank follows a policy of interest rate smoothening, changing the policy rate gradually to achieve the price stability goal.

**6.6 Discussion:**

We have included the institutional quality in the Taylor rule framework to assess the role of institutions in the conduct of monetary policy. The results indicate that in the long run institutional quality does not explain the variation in rate of interest as the coefficient of institutional quality is insignificant. Though, in the short run, the relationship between institutions and interest rate is significant and institutional quality affects the rate of interest at multiple lags but no clear picture emerges from the results as the direction of the impact (positive/negative) changes from lag to lag. The insignificant relationship between institutions and interest rate in the long run and changing nature of relationship in the short run when viewed together, not much can be inferred regarding the interest rate-institutional quality relationship.

The results further indicate that monetary authority reacts to increase in inflation by increasing the rate of interest. This is true both in long run as well as short run. This shows that the central bank has been following an inflation averse monetary policy. As the inflation goes up, rate of interest also goes up and this reaction is more than one for one. In short run, at first lag this relation reverses, showing a negative relationship with interest rate.

The results further indicate that in the long run, there is a negative and highly significant relationship between the rate of interest and output gap. This shows that state bank has been following a procyclical stance – as the output gap increases, the rate of interest decreases. This result is consistent with the findings of Calderon *et al.* (2010) and Duncan (2011) as they argue that developing nations with weak institutors follow a procyclical monetary policy. These results are also consistent with Malik and Ahmed (2007).

Our long run results regarding output and inflation are consistent with the findings of Islam (2009). The study finds negative coefficient of output while positive coefficient for inflation but of a magnitude of less than one. Moreover, our long run results regarding inflation are closer to the prediction of Taylor rule as the weight on inflation in the long run is almost equal to what was proposed by Taylor (1993). Results are also consistent with Iqbal (2009).

As the error correction term is highly significant this implies that the central bank has been following a policy of interest rate smoothening. The results indicate that the central bank changes it policy rate gradually, and accounts for the previous year's error.

Overall, the results indicate that the central bank has not been following the Taylor rule even after controlling for institutional quality. Other than institutional quality, possible explanations for not following the Taylor rule framework could be fiscal dominance, weakness of central bank, and rigidities of financial sector. When looked closely, the three aforementioned reasons seem to be rooted in institutional quality itself.

# Chapter 7: Conclusion and Recommendations

Monetary policy plays an important role in shaping the macroeconomic environment of a country. It affects the economy through various channels but the strength and magnitude of these effects depends upon the efficiency of the channel and rigidities involved. It is argued that for monetary policy to be efficient, some sort of rule must be observed while framing the policy. One popular rule for the conduct of monetary policy is the Taylor rule. Literature suggests that SBP has not been following any rule. The new institutional economists argue that institutions influence the effectiveness of the monetary policy. Building on this proposition, we examined whether the monetary policy rule, i.e. Taylor rule, can be observed for Pakistan by incorporating the institutional quality in the Taylor rule framework.

To test our hypothesis empirically, we used annual data from 1984 to 2011. To capture the institutional quality we used International Country Risk Guide (ICRG) dataset and constructed an index of institutional quality using the principal component analysis. To estimate the empirical model, we used ARDL method following Ruth (2004).

Overall, the results indicate that effect of institutional quality on monetary policy is not clear. Institutional quality affects the monetary policy in the short run but the direction of the impact changes from lag to lag, while in the long run impact of institutional quality is insignificant. The results also suggest that the central bank has been putting more weight on inflation stabilization rather than output stabilization. It could be due to the fact that inflation during the period has, by and large remained at a relatively higher level. Moreover, during most of the period covered by the study's data span the country has been borrowing under the IMF structural adjustment

programs. Almost all of these programs required containing the fiscal deficit. This again required a focus upon inflation.

We found that the central bank has not been following Taylor rule in setting the policy rate of interest even after controlling for the institutional quality. This result is at variance with the findings for the developing countries in a cross country setting (Duncan, 2011). The reason could be that the institutional quality is poorer in Pakistan than typically observed in the countries included in the said study.

Our results also suggest that the central bank follows an interest rates smoothening policy as the error correction term is highly significant and about three forth of the error is accounted for in the current period. Our results confirm that monetary policy of Pakistan is highly procyclical as suggested in the literature. We argued that the procyclicality could be due to the low institutional quality. Other than institutional quality, possible explanations include fiscal dominance, weakness of central bank, and rigidities of financial sector. When looked closely, the three aforementioned reasons seem to be rooted in institutional quality itself. Thus the institutional quality seems to be a primary determinant of the cyclicality of monetary policy.

On the basis of our findings we suggest that state bank may consider institutional properties of the country before setting the policy rate. Though the central bank cannot influence the institutions of the country but the inclusion of this variable can help the central bank to predict the outcomes of its policy changes with greater accuracy.

# References


Acemoglu, D., S. Johnson, and J. A. Robinson (2001) The Colonial Origins of Comparative Development: An Empirical Investigation. *American Economic Review, 91* (5), 1369-1401.

Acemoglu, D., S. Johnson, and J. A. Robinson (2002) Reversal of Fortune: Geography and Institutions in the Making of the Modern World Income Distribution. *Quarterly Journal of Economics, 118*, 1231-1294.

Acemoglu, D., S. Johnson, and J. A. Robinson (2005) *Institutions as the Fundamental Cause of Long Run Growth.* (P. Aghion, and S. Durlauf, Eds.) North Holand.

Ajaz, T., and E. Ahmad (2010) The Effect of Corruption and Governance on Tax Revenues.*The Pakistan Development Review*, 49(4), 405–417.

Al-Marhubi, Fahim A. (2000) Corruption and inflation. *Economics Letters*, 66(2), 199-202.

Alfaro, L., S. Kalemli-Ozcan and V. Volosovych (2008) Why Doesn't Capital Flow from Rich to Poor Countries? An Empirical Investigation, *The Review of Economics and Statistics*, 90(2), 347-368.

Aysan, A. F., M. K. Nabli, and M. A. Véganzones-Varoudakis (2007) Governance Institutions And Private Investment: An Application To The Middle East And North Africa.*The Developing Economies*, 45(3), 339-377.

Barro, R. J., and D. B. Gordon (1983) Rules, Discretion and Reputation in A Model of Monetary Policy.*Journal of Methematical Economics, 12*, 101-121.

Barseghyan, L., and R. DiCecio (2010) Institutional causes of output volatility. *Review* , 205-224.

Blackburn, K., K. C. Neanidis, and M. E. Haque (2008) *Corruption, Seigniorage and Growth: Theory and Evidence,* CESifo Working Paper Series 2354, CESifo Group Munich.

Calderon, C., R. Duncan, , and K. Schmidt-Hebbel(2010)*Institutions and Cyclical Properties of Macroeconoimic Policies in the Global Economy*.Documentos de Trabajo 372, Instituto de Economia,Pontificia Universidad Católica de Chile.

Carmignani, F. (2003) Political Instability, Uncertainty and Economics.*Journal of Economic Surveys, 17* (1), 1-54.

Choudhary, M. A., M. N. Hanif, S. Khan, and M. Rehman (2010) *Procyclical Monetary Policy and Governance.*SBP Working Paper Series No. 37. State Bank of Pakistan.

Clarida, R., J. Gali, and M. Gertler (1999) The Science of Monetary Policy: A New Keynesian Prospective.*Journal of Economic Literature, 37* (4), 1661-1707.

Dai, M., M. Sidiropoulos, and E. Spyromitros (2010) *Fiscal policy, institutional quality and central bank transparency.* MPRA Paper 23766, University Library of Munich, Germany.

Dimakou, O. (2006) *Monetary and Fiscal Policy Interactions: The Role of the Quality of Institutions in a Dynamic Environment.* Birkbeck Working Papers in Economics and Finance No. 0607, Birkbeck, Department of Economics, Mathematics & Statistics.

Dreher, A., and T. Herzfeld (2005) *The Economic Costs of Corruption: A Survey and New Evidence.* Public Economics, EconWPA.

Delis, M. D. (2012) Bank competition, financial reform, and institutions: The importance of being developed.*Journal of Development Economics*, 97(2), 450-465.

Duncan, R. (2011) *Institutional Quality, the Cyclicality of Monetary Policy and Macroeconomic Volatility.* Manuscript, Ohio University.

Egert, B., and R. MacDonald (2006) *Monetary Transmission Mechanism in Transition Economies: Surveying the Surveyable*. CESifo Working Paper Series, No. 1739, CESifo Group Munich.

Engle, R. F., and C. W. Granger(1987) Cointegration and error correction representation: estimation and testing. *Econometrica, 55*, 251–276.

Frankel, J. A. (2010)*Monetary Policy in Emerging Markets.* NBER Working Paper 16125 .

Gerlach-Kristen, P. (2003) *Interest Rate Reaction Functions and the Taylor Rule in the Euro Area.* Working Paper Series No. 258, European Central Bank.

Hanif, M. N. (2003) Restructuring of Financial Sector in Pakistan. *The Journal of the Institute of Bankers in Pakistan* .

Hielscher, Kai. and G. Markwardt (2011) *The Role of Political Institutions for the Effectiveness of Central Bank Independence.* CESifo Working Paper Series 3396, CESifo Group Munich.

Hofmann, B., and B. Bogdanova (2012) Taylor Rules and Monetary Policy: A Global "Great Deviation"?.*BIS Quarterly Review* , 37-49.

Huang, H., and S-J.Wei (2006) Monetary Policies for Developing Countries: The Role of Institutional Quality.*Journal of International Economics, 90*, 239-252.

Huang Y., R. K. Morck and B. Yeung (2004)ASEAN and FTAA: External Threats and Internal Institutional Weaknesses. *Business and Politics,* 6(1), 4.

Iqbal, N. (2009) The Estimation and Evaluation of Monetary Reaction Function: An Empirical Study for Pakistan. *International Review of Business Research Papers*, 5, 325-345

Islam, M. S.(2009)*Rule-based Monetary Policy for Developing Countries, Evidence from Developed Countries.* Unpublished Dissertation, Lund University.

Janjua M. A. (2004) *History of the State Bank of Pakistan (1988–2003).* Karachi: State Bank of Pakistan.

Johansen, S. (1991) Estimation and hypothesis testing of cointegrating vectors in Gaussian vector autoregressive models.*Econometrica, 59,* 1551–1580.

Johansen, S. (1995)*Likelihood-Based Inference in Cointegrated Vector Autoregressive Models.*Oxford University Press, Oxford University.

Jolliffe, I. T. (2002)*Principal Component Analysis*, 2nd edition, Springer.

Judd, J. P., and G. D. Rudebusch (1998) Taylor's rule and the Fed, 1970-1997.*Economic Review*, 3-16.

Kaminsky, G. L., C. M. Reinhart, and C. A. Vegh (2005) *When It Rains, It Pours: Procyclical Capital Flows and Macroeconomic Policies.* NBER Macroeconomics Annual 2004.

Keefer, P., and S. Knack (1997) Why Don't Poor Countries Catch Up? A Cross-National Test of an Institutional Explanation,*Economic Inquiry, 35* (3), 590–602.

Keynes, J. M. (1936) *The General Theory of Employment, Interest and Money*. London, Macmillan.

Kydland, F. E. and E. E. Prescott (1977) Rules Rather than Discretion: The Inconsistency of Optimal Plans.*The Journal of Political Economy*, 85(3), 473-492.

Khan, M. A., and S. Khan (2007) *Financial Sector Restructuring in Pakistan.*MPRA Paper No. 4141, University Library of Munich, Germany

Khan, M. S., (2003), *Current Issues in the Design and Conduct of Monetary Policy.* No 03/56, IMF Working Papers, International Monetary Fund.

Khan, M. S. (2009). The design and conduct of monetary policy: lessons for Pakistan. *Pakistan Development Review*, 48(4), 337-350.

Khwaja, M. I., and S. Khan (2008) Pass-through of Change in Policy Interest Rate to Market Rates. *Pakistan Development Review, 47* (4 Part II), 661-671.

Knack, S. (1996) Institutions and the Convergence Hypothesis: The Cross-National Evidence. *Public Choice*, 87(3-4), 207-28.

Kozicki, S. (1999) How Useful Are Taylor Rules for Monetary Policy?.*Economic Review* (Q II), 5-33.

Law, Siong H. and W. N. W. Azman-Saini (2008) *The Quality of Institutions and Financial Development.* MPRA Paper 12107, University Library of Munich, Germany

Lucas, R. (1990) Why Doesn't Capital Flow From Rich to Poor Countries?.*AmericanEconomic Review*, 80, 93-96.

Malik, W. S. (2007)*Monetary Policy Objectives in Pakistan: An Empirical Investigation.* Working Paper No. 35 . PIDE Working Paper Series.

Malik, W. S., and A. M. Ahmed(2007)*The Taylor Rule and the Macroeconomic Performance in Pakistan*. Working Paper No. 34 . PIDE Working Paper Series.

Malik, W. S., and A. M. Ahmed (2011) The Economics of Inflation, Issues in the Design of Monetary Policy Rule, and Monetary Policy Reaction Function in Pakistan. *Lahore Journal of Economics*, 16(Special E), 213-232.

Mihal, M. H. (2009) *Monetary policy and institutional quality*, ETD Collection for Fordham University. Paper AAI3377051.

Mathew, J. (2006)*Measuring Central Bank Independence in Twenty- Five countries: A New Index of Institutional Quality*. Presentation paper: 8th Annual Conference on Money and Finance in Indian Economy.

Martinez, G. X. (2010)*The Cost of Borrowing, Institutional Quality, and Capital Openness.* Working Papers 1001, Ave Maria University, Department of Economics.

Mauro, P.(1995) Corruption and Growth. *The Quarterly Journal of Economics*, 110(3), 681-712.

Miletkov, M. and M. B. Wintoki (2012) Financial development and the evolution of property rights and legal institutions.*Emerging Markets Review*, 13(4), 650-673.

North, D. C. (1990)*Institutions, Institutional Change and Economic Performance.* New York: Cambridge University Press.

Ouattara, B. (2006) Aid, debt and fiscal policies in Senegal, *Journal of International Development,* 18(8), 1105-1122.

Olsson, O. (2005) Geography and Institutions: A Review of Plausible and Implausible Linkages. *Journal of Economics, 10,* 167-194.

Osili, U. O., and Paulson, A. (2004). *Institutional quality and financial market development: evidence from international migrants in the U.S.* Working Paper Series WP-04-19, Federal Reserve Bank of Chicago.

Pesaran, M. H. (1999)*An autoregressive distributed lag modelling approach to cointegration analysis*. Cambridge University.

Pesaran, M. H., Y. Shin, and R. J. Smith, (2001) Bounds testing approaches to the analysis of level relationships.*Journal of Applied Econometrics, 16* (3), 289-326.

Qayyum, A. (2008) *Does Monetary Policy Play Effective Role in Controlling Inflation in Pakistan*, MPRA Paper 13080, University Library of Munich, Germany.

Rhodrik, D. (2006) Institutions for High Quality Growth: What They Are and How to Acquire Them. In K. C. Roy, and J. Sideras, *Institutions, Globalisation and Empowerment.* Elgar, UK.

Ruth, K. (2004) *Interest Rate Reaction Functions for the Euro Area Evidence from Panel Data Analysis.* Discussion Paper Series 1: Economic Studies No.2004,33, Deutsche Bundesbank, Research Centre .

Shleifer, A.andR. W. Vishny(1993) Corruption, *The Quarterly Journal of Economics,* 108(3), 599-617.

Sulaiman, D. M., A. Hussain,M. Ahsanuddin, S. Kazmi, and I. Lal(2012) Monetary Policy Reaction Function in Open Economy Version: Empirical Evidence in Case of Pakistan.*Asian Social Science*,8 (8), 89-95

Svensson, L. E. (1996)*Inflation Forcast Targeting: Implementation and Monitoring Inflation Targets.* Working Paper No. 5797, NBER Working Paper Series.

Svensson, L. E. (2003)*Inflation Monetary Policy and Real Stabilization.*Working Paper No. 9486, NBER Working Paper Series.

Taylor, J. B. (1993) Discretion Versus Policy Rules in Pratice. *Carnegie-Rochester Conference Series on Public Policy*, *93*, 195-214. North-Holand.

Taylor, J. B. (1999) A historical analysis of monetary policy rules. In J. B. Taylor (Ed.), *Monetary policy rules.* Chicago, IL: University of Chicago Press.

Taylor, J. B. (2007) Thirty-Five Years of Model Building for Monetary Policy Evaluation: Breakthroughs, Dark Ages, and a Renaissance.*Journal of Money, Credit and Banking,* 39 (Supplement) (1), 193-201.

Wu, Y. (2008)*The Role of Institutional Quality in a Currency Crisis Model*. IMF Working Paper , Working Paper No. WP/08/5, .

Xu, L. C., H. Li, and H. Zou, (2000) Corruption, Income Distribution, and Growth.*Economics and Politics, 12* (2), 155-181.