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September 2008

Online at <https://mpra.ub.uni-muenchen.de/19575/>  
MPRA Paper No. 19575, posted 25 Dec 2009 10:37 UTC

# What Does Pakistan Have to Join Inflation Targeters Club, A Royal Flush or A Seven-Deuce Offsuit?

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## Abstract

*The economic and institutional structure required for successful adoption and implementation of Inflation Targeting (IT) framework is often lacking in Emerging economies. In this paper, we evaluate these structures for the economy of Pakistan both qualitatively and quantitatively. Although our comprehensive assessment identifies non-realization of many core requirements but as literature and real time experience pointed out that IT can be a framework for emerging economies even in the absence of these conditions, we go further by investigating that if State Bank of Pakistan (SBP) decides to adopt IT, does there exist a stable and significant relationship between policy rate (monetary tool) and inflation measure (objective)? This bivariate relationship is important to be analyzed given the important role of interest rate in mitigating the deviations between actual and target inflation while working within the IT framework. To illustrate this relationship, we use Granger Causality test and our estimates fail to find any significant link between interest rate and inflation. On the basis of overall findings, this study suggests that Pakistan, due to the absence of most fundamental requirements of IT, is perhaps not ready for Inflation Targeting yet.*

**Keywords:** Inflation Targeting, Pakistan, Monetary policy

**JEL classification:** E30, E52, E58

## Acknowledgement:

We are grateful to Prof. Christian Bordes (Université Paris 1) for his continuous guidance, detailed comments and valuable suggestions at the various stages of the research that not only improved the quality of this article but eventually helped us to bring it in its final shape.

## **I: Introduction**

Over the last two decades, a monetary policy framework that has gained recognition all over the world is the Inflation Targeting Framework (ITF); and there is a growing literature regarding its applicability, its effects on economic performance and its superiority to other frameworks (Exchange rate targeting, monetary aggregate targeting). Inflation Targeting has been defined as a framework for monetary policy in which central banks commit to low and stable inflation as their long term objective, make public announcement of quantitative targets and hold themselves accountable for these targets (Bernanke et al., 1999). In literature, three rationales can be attributed to the widespread adoption of IT. First, the only macro-economic variable that monetary policy is capable of affecting in the long run is inflation rate. Second, there is almost consensus about the negative impacts of even modest inflation rate on economic efficiency and growth. Although, the link between inflation and overall economic performance is ambiguous in theory as inflation is determined with the interaction of many factors, but significant econometric studies are available that associate high inflation with low productivity and with low rate of growth (Fischer, 1993; Judson and Orphanides, 1996; Sarel, 1996; Bruno and Easterly, 1998; and Hess and Morris, 1996). And the third reason for the popularity of inflation targeting is that it works as “nominal anchor” by imposing several constraints on CBs.

Successful adoption and implementation of inflation targeting strongly requires the existence of some “economic” and “institutional” pre-requisites in the candidate country but when it comes to emerging and developing economies, these pre-requisites often do not exist (Masson et al., 1997). These pre-requisites can be described as; independence of central bank, transparency of information, fiscal discipline, floating exchange rate, moderate or low debt level, sufficient foreign reserves, demand side dominance and the strength of financial system (Masson et al., 1997; Bernanke et al., 1999; Blejer et al., 2000; Mishkin, 2000; Taylor, 2000; and Siklos, 2002). In this study, we evaluate these pre-requisites both qualitatively and quantitatively to assess the applicability of Inflation Targeting for Pakistan. In addition, we examine that if State Bank of Pakistan (SBP) wants to adopt Inflation Targeting as its main monetary policy framework, does there exist a stable and significant relationship between interest rate proxied by policy rate (PR hereafter) which is the principal monetary policy tool used to affect inflation in Inflation Targeting countries, and inflation (proxied by consumer price index; CPI)? To illustrate this bivariate relationship, we use *Granger – Causality* test through which we intent to investigate the authenticity of causality running from policy rate to inflation (policy rate *Granger-cause* inflation). This gives us an idea whether the policy rate is able to affect inflation, its behavior and its dynamics to the same extent as it is required by Inflation Targeting framework to mitigate the deviations between actual and target inflation in short run.

Our assessment of pre-requisites reveals that Pakistan either does not meet most of the pre-conditions of Inflation Targeting or just partially meet them. In addition, as far as the relationship of interest rate and inflation measure is concerned, our results indicate that PR does not *Granger-cause* inflation which means that interest rate does not seem to affect inflation directly and thus cannot be used to forecast inflation dynamics.

The remainder of this paper is organized as follow: *Section II* provides an overview of monetary policy developments in Pakistan and the main objectives of its monetary policy. *Section III* discusses the pre-requisites for the adoption of Inflation Targeting framework; and broadly assesses whether Pakistan meets those requirements or not. *Section IV* develops an econometric framework to check the viability of Inflation targeting framework in Pakistan by estimating the relationships among inflation measure, short term interest rate and some other policy anchors; and *Section V* concludes.

## **II: Monetary Policy Developments in Pakistan**

In the late 1980s, the monetary authorities in Pakistan started working on '*comprehensive financial sector reforms*' with the help of International Monetary Fund (IMF) and World Bank. Many steps have been taken during these reforms and two of them were the turning point for monetary sectors.

1. First one was the independence of the Central Bank of Pakistan that took place in 1994 when SBP was assigned the sole responsibility of making and conducting Monetary Policy.
2. Second important step was the adoption of market-based or indirect instruments of monetary policy. Before these market-based instruments and tools, SBP used to rely on administered monetary policy regime governed by ad hoc changes in: reserve ratio, directed credit and regulated interest rate policies.

From the onslaught of financial sector reforms in Pakistan during 1980s and the initiation of the independence of SBP in 1993, SBP started to follow "Monetary Aggregate Targeting" in 1994, assuming stable demand for money function in Pakistan. The ultimate goals of monetary policy under the framework of Monetary Aggregate Targeting was inflation reduction (maintain price stability) and output growth with Broad Money (M2) as intermediate target and base money or reserve money as operational target. Moreover, with the adoption of market-based instruments more attention was paid to the management of short term interest rate and SBP adopted 3-day SBP discount rate as major policy instrument to signal easing or tightening of monetary policy.

Since 1994, SBP is pursuing "Monetary Aggregate Targeting" in which SBP announces and pursues monetary growth target (intermediate target) consistent with the government's real GDP growth and inflation rate targets (ultimate targets and objectives). Although SBP has the

ultimate objective of high GDP growth and low inflation which is also confirmed by the objective function developed by Malik (2007) but it also indicates that the policy has been focused on several other factors like foreign interest rate, exchange rate and trade deficit.

Monetary policy in Pakistan is characterized by “*Discretion and Judgment*” rather than “*Model or Rule based*” which brings the problem of time inconsistency<sup>1</sup>. It is worth noting that though SBP is following monetary aggregate targeting but there is no information available about underlying macro-economic model being used by it. SBP only announces the short term targets for the period of one year and there are no model based projections given for the medium term. Geraats (2005a) argues that short term targets are indeed the forecasts rather than the targets in a real sense because of the fact that monetary policy affects inflation with lags greater than one year.

### **III: Infrastructure for the Adoption of Inflation Targeting in Pakistan**

*Discretion and Judgment based* actions that currently characterize the monetary regime of Pakistan as well, were the dilemma that led to the popularity of Inflation Targeting Framework in the rest of the world. IT is not a pure “rule”; rather it is a framework for policy within which “constrained discretion” can be exercised. This discretion is constrained by the announcement and commitment of a central bank to pursue low stable inflation as its ultimate objective.

Beginning with the New Zealand, there are many developed and emerging economies that have adopted IT and the experience of these economies with IT has been generally positive. However, it is often argued that economic structures in emerging economies are incapable of supporting an IT regime in the short and medium run. Ample research has been conducted to identify whether IT could be an appropriate framework for these economies despite the absence of its pre-requisite, and the answer is positive (Masson et al., 1998).

#### **III.a Pre-Requisites**

There are varying pre-requisites for IT defined in the literature. In table 1, we provide a consensus based list of those pre-requisites (Siklos, 2002; Bernanke et al, 1999; Blejer et al, 2000; Masson et al, 1997; Taylor, 2000; and Mishkin, 2000).

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<sup>1</sup> See literature: Kydland and Prescott (1977) ; Barro and Gordon (1983)

<b>Table 1</b>	
<b>Pre-requisite</b>	<b>Rationale</b>
Independence of Central Bank	Independence is important to make the policy credible and to make responsibilities and accountability clear.
Transparency of information	The central bank ought to communicate clearly and frequently with government, markets and the public in order to earn credibility. This condition is often referred to as the transparency objective.
Fiscal Discipline	Fiscal policy must be compatible with Monetary policy and the conduct of MP should not be constrained by fiscal deficit. This requires that fiscal deficits should be reduced by using revenue-based measures rather than relying on the CB for domestic borrowing (Masson et al., 1997). High fiscal deficits also lead to high inflationary pressures in the economy.
Floating Exchange Rate	In the long run, inflation targeting works best with flexible exchange rate regime, but short term intervention may be permissible during transition period.
Moderate or low debt level	In the case of high foreign debt level, there exists a trade-off between the priorities of inherited conflicting objectives of monetary and fiscal policies.
Sufficient Foreign Reserves	The buffer created by foreign reserves should be adequate for the successful implementation of IT.
Demand side dominance	Inflation Targeting works in the case of demand side dominance, supply side dominance makes IT unsuitable for a country.
Financial system strength	The strength of financial system is crucial as the decisions of CB flows to the economy through financial markets.

### **III.b Does Pakistan meet pre-requisites of IT?**

In the following paragraphs, we evaluate the economy of Pakistan against the pre-requisites listed above.

#### **III.b.1 Independence of Central Bank**

The empirical justification for Central Bank (CB) autonomy is based on studies demonstrating that there is a robust negative correlation between CB's autonomy and inflation. Different indices have been developed to proxy central bank's autonomy and to establish its relationship with macroeconomic variables; and these indices can be categorized as *de jure* and *de facto*. Although, earlier studies mostly focused on developed countries, but two studies that provide a more global approach of the issue and are widely cited, are those of Cukierman (1992) and Cukierman and Webb (1995). These studies are based on *de facto* measures of CB's autonomy and provide better results in case of developing countries.

State Bank of Pakistan Act, 1956 with subsequent amendments, describes the current functions and responsibilities of SBP as the central bank of Pakistan. Two amendments are worth noting with reference to SBP's autonomy.

- A bill was passed in February 1994 that established the formal and legal autonomy of SBP by making monetary policy its sole responsibility.

- An amendment was approved in January 1997 that further enhanced the independence of SBP by giving it the right to determine and enforce limits on government borrowing from it.

However, later on, an Ordinance of 2000 compromised the effective autonomy of SBP in two ways. First, by authorizing the federal government to direct SBP to set up funds for special purposes (credit schemes); and second by delegating authority to appoint the Governor of SBP to the President that made SBP vulnerable to political pressures (Wasim and Musleh-ud Din, 2008).

Although, the ordinance of 2000 deteriorated the SBP's independence, however, to counter that, in 2005, the *Fiscal Responsibility and Debt Limitation Act 2005* was passed that requires Government to reduce its revenue deficit to zero by 30th June 2008 and maintain it thereafter, and concurrently reduce public debt to sixty percent of GDP by 2013 and below that limit thereafter. However there were serious flaws in its implementation pointed out by Shamshad Akhtar, the governor of SBP who said that *"the government had borrowed 204 billion rupees between January and March and 283.9 billion from April to June (2008). In the last two days alone, it borrowed 55 billion rupees, she added"*.

A recent IMF working paper of 2007 calculates autonomy of the central banks of 163 countries as by the end of 2003. Comparative results with reference to Pakistan are reported in table 2 below.

<b>Table 2</b>			
	<b>Political Autonomy</b>	<b>Economic Autonomy</b>	<b>Overall Autonomy</b>
Pakistan	0.38	0.63	0.50
India	0.25	0.75	0.50
Average for EMEs	0.56	0.75	0.65
Average for Advanced Economies	0.70	0.81	0.75

Source: Arnone et al (2007)

IMF calculation and recent facts mentioned above suggest that SBP is much less politically independent when compared to the emerging and developed economies not only overall but individually in Political and in Economic domain as well.

### **III.b.2 Transparency of Information**

Transparency is another important pre-requisite of IT and a by-product of central bank's independence. With the passage of time, the importance of transparency has been increased due to its impact on expectations and uncertainty about economic variables. Faust and Svensson (2001), Barro-Gordon (1983), Walsh (1999), Geraats (2002), Sorensen (1991), all of them using different economic indicators show that more information is better as it reduces uncertainty about economic variables. The transparency of central bank is vital and important not only for the IT framework but for every monetary policy regime (Chortareas et al., 2002).

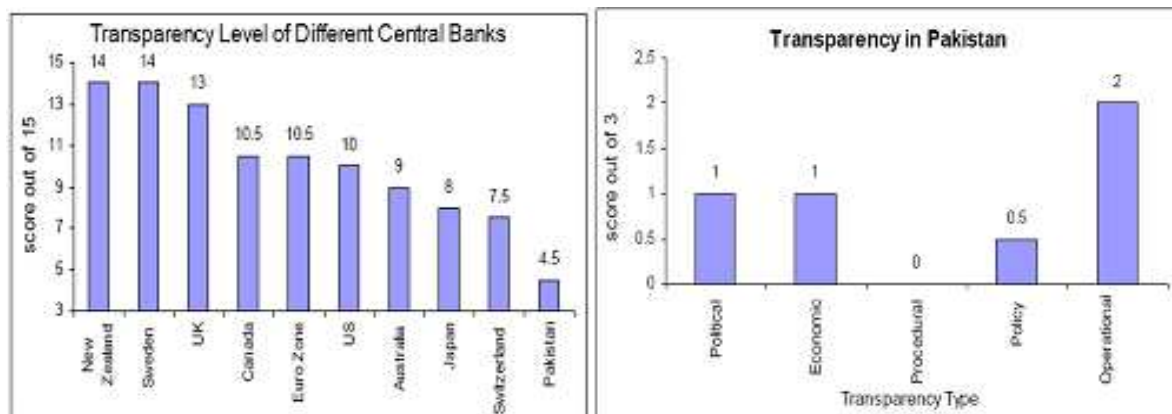
Dincer and Eichengreen (2006) have measured the transparency of 100 central banks including Pakistan. They followed the definition of transparency proposed by Eijffinger and Geraats (2002) and by taking a large number of central banks as done by Fry et al. (2000). They are of the view that “central banks in the advanced countries are more transparent than central banks in emerging markets (defined as middle-income countries with significant links to international financial markets), which in turn are more transparent than central banks in developing countries”. The transparency of SBP as measured by this approach is provided in table 3 below:

Table 3								
	1998	1999	2000	2001	2002	2003	2004	2005
<b>Pakistan</b>	2.5	2.5	2.5	2.5	2.5	2.5	3.5	3.5

Source: Dincer and Eichengreen (2006)

Following Eijffinger and Geraats (2002), Wasim and Musleh-ud Din (2008) have analyzed the monetary policy transparency in Pakistan. According to them, SBP scored 4.5 out of 15(highest) in transparency as depicted in figure 1 below.

Figure 1



Source: Wasim and Musleh-ud Din (2008)

State Bank of Pakistan pursues multiple objectives with the dual mandate of price stability and output growth. SBP announces short term targets but it does not announce medium term objectives. The economic data on GDP and inflation is available on quarterly basis, but there is no information which macro-economic model or rule is being used by SBP for forecasting and establishing short term targets, in addition to this, no comprehensive forecast is made for future. Any policy change in instrument / tool is announced at the day of implementation, but no information / explanation is provided related to the change in operating target or the effect of that change on intermediate target. There is no information on the institutional settings for interaction between monetary and fiscal authorities, which is the prime reason of poor coordination between government and SBP. SBP provides information on forecasting errors but it does not explain how forecasting had been made and what contributes to these forecasting errors. SBP also does not provide information on the exact contribution of the Monetary Policy



in achieving the announced objectives rather it conduct some superficial and vague policy evaluation.

These facts show that the transparency level of SBP is quite low, which is the major hindrance for the implementation of inflation targeting framework. Unless central bank is transparent, its credibility will be low and it cannot anchor public expectations as a result of which the policy actions cannot be transmitted to the economy in a desired manner.

### **III.b.3 Fiscal Discipline**

An important pre-requisite in the successful adoption of IT is the absence of fiscal deficit and the coordination between fiscal and monetary authorities. According to Masson et al. (1997), fiscal dominance is one of the major obstacles in the implementation of Inflation Targeting.

Fiscal deficits are highly inflationary through their impact on money supply. There is a ferocious cycle between fiscal deficit and inflation. High deficit is financed through increase in money supply, high money supply causes high inflation, to curb this inflation, interest rates are raised, which not only crowd out investment, but also raise deficit further by raising debt payments; the inflation also indirectly impact fiscal deficit by reducing the real value of tax collection; and like this the cycle continues (Jha, 2004; Engen and Hubbard, 2004).

The economy of Pakistan is characterized by high fiscal deficits. The budget deficit has widened to 8.3 percent of GDP in the 12 months to June 30. That's the highest since 1991 when it reached 8.8 percent of GDP, according to finance ministry website<sup>2</sup>. The monetary policy cannot be effective to limit inflation in the existence of expansionary fiscal policy and high government borrowings from the banking sector. Almost *60 percent of the budget deficit* was financed by commercial banks and SBP for the period of July 1 – Jan 29, FY08<sup>3</sup> (SBP MPS of Jan-June, 2008).

As stated by Agha and Khan (2006), inflation is affected by government's bank borrowings for budgetary support and fiscal deficit. *"Our inflation is reaching alarming levels mainly due to borrowing,"* said SBP Governor Shamshad Akhtar, while announcing the monetary policy for the fiscal year 2008 – 2009.

In this situation, even if SBP adopts price stability as its primary objective, the achievement of this objective would be dependent on fiscal discipline in the economy. SBP does not have the option of refraining itself to finance the high fiscal deficit because if it decides to do so, the outcome would still be inflationary as the public debt/GDP ratio could turn unsustainable in the medium term.

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<sup>2</sup> <http://www.nation.com.pk/pakistan-news-newspaper-daily-english-online/Politics/30-Jul-2008/Govt-borrowings-alarm-State-Bank>

<sup>3</sup> [http://www.sbp.org.pk/m\\_policy/MPS-JAN-JUNE-FY08-EN.pdf](http://www.sbp.org.pk/m_policy/MPS-JAN-JUNE-FY08-EN.pdf)

Figure 2

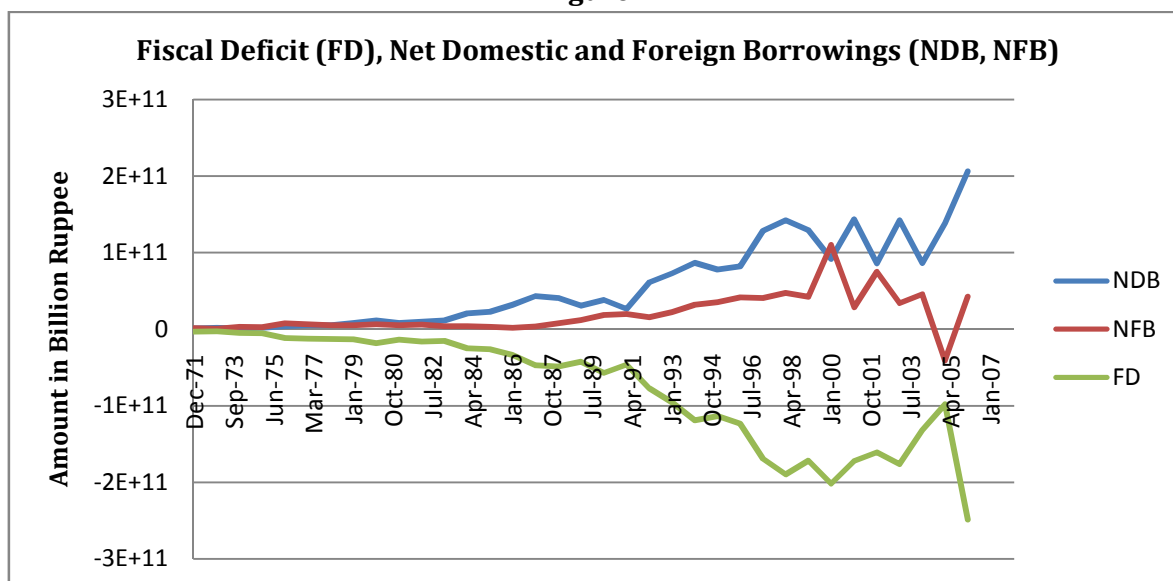


Figure 2 shows clearly the higher level of fiscal deficit after 1990. The same pattern can also be observed in domestic and foreign borrowings. Although, there seems to be a systematic switch between domestic and foreign borrowings which can be due to the reason that probably, government used these two borrowings to redeem each other alternatively. This situation is more likely keeping in view the fact that the main source of deficit financing in Pakistan is borrowings either from the banking sector or from the foreign government.

Pakistan has always been exposed to high fiscal deficits throughout its history and is the major hindrance in the proper working of monetary policy. The absence of this pre-requisite is considered sufficient enough to reject the adoption of IT by emerging economies, and favors the exchange rate targeting in these countries.

### III.b.4 Floating Exchange Rate

Another important pre-requisite of Inflation Targeting is floating exchange rate regime. Pakistan has been following fixed peg exchange rate regime up to early 1980s, however, after that, the monetary authorities decided to abandon it in order to initiate an important transmission mechanism of monetary policy. As a result of this policy shift the exchange rate regime has been evolved to “*managed float*” till 2000 and “*free floating*” thereafter (Khan and Qayyum, 2007). Though, the Pakistan has been claiming to follow floating exchange rate regime, however, an IMF report (2006), regarding *de facto* exchange rate regimes of different countries ranks Pakistan as one of those countries having differently claimed (*de jure*) and actual (*de facto*) exchange rate policies. According to the report, in actuality, Pakistan falls under the category of “*other conventional fixed peg arrangement*”<sup>4</sup>.

<sup>4</sup> <http://www.imf.org/external/np/mfd/er/index.asp>

This inconsistency between de jure and de facto actions of monetary authorities and their reluctance to let the exchange rate float freely can be explained by “Fear-of-Floating” literature by (Calvo and Reinhart, 2002) which says that:

- Exchange rate vulnerability can severely affect the balance sheet of an economy through banking, corporate or even public sectors if the economy has high liabilities denominated in foreign currency.
- Exchange rate vulnerability may be passed to domestic price levels by its pass-through mechanism that can be highly inflationary.

According to Hussain (2006), apparent evidence of potential balance-sheet-type effects seems to suggest a case for a peg of rupee. However, there is little evidence of significantly higher pass-through of exchange rate into domestic inflation in Pakistan than in other countries. Hyder and Shah (2004) come to the same point that exchange rate pass-through effect on domestic inflation in Pakistan is quite weak.

**III.b.5 Sufficient Foreign Reserves**

On the one hand the foreign reserves of Pakistan are decreasing due to high trade deficit and debt servicing, and on the other hand the devaluation of Pakistani rupee is also increasing the burden of foreign borrowing and trade deficit. Figure 3 shows the forex reserve held by SBP and Banks in the form of SDR and USD.

**Figure 3**

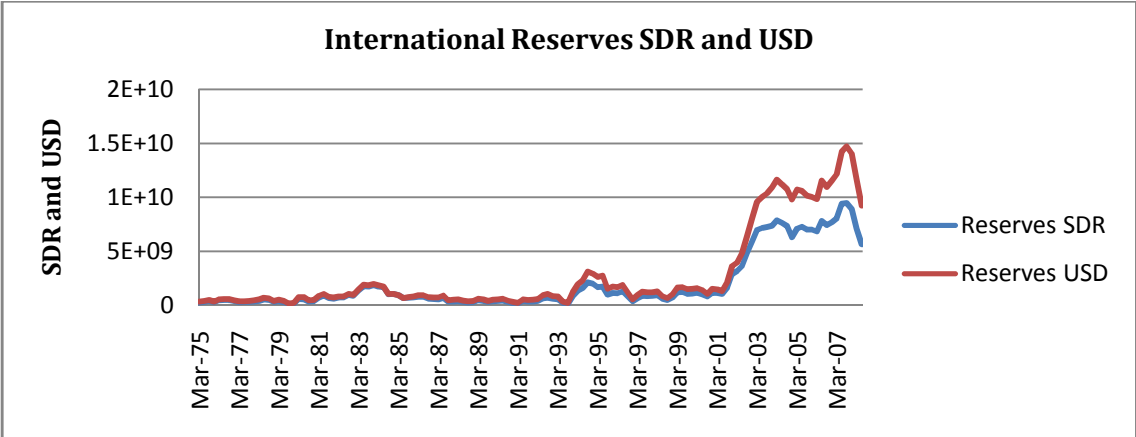


Figure 3 above clearly indicates that forex reserves of Pakistan have always been low until 2000 after which a sharp increase can easily be observed. The probable reason for this drastic increase is said to be the event of 9/11 in USA, which triggered the high foreign remittances from all over the world to Pakistan. This was also confirmed by SBP while emphasizing additionally on the contribution and rise in foreign direct investment. Foreign direct investment rose more than 69 percent to \$2.1 billion in the first seven months of the 2006/07 fiscal year

(July-June), led by inflows into the financial, communications, and energy sectors. However, Pakistan's foreign reserves, which hit a record high of \$16.5 billion in October, 2007, have been depleted by high payments for oil imports and fell to \$9.57 billion in the week ended on August 16, 2008 (Reuters, August 22, 2008).

The history of foreign reserves in Pakistan is not marked by high levels in the past, although, there was a constant increase during 2000 to 2007, but the even higher level of uncertainty since 2007 suggests that Pakistan probably would not be able to maintain the sufficiently higher level of reserves required for the successful adoption of IT framework.

### **III.b.6 Demand side Dominance**

An implicit assumption behind ITF is that monetary policy should respond primarily to demand side shocks as the recurrence of supply shocks limits the role of monetary policy in containing inflation. Pakistan is a small open economy which is highly dependent on imports and the supply shocks such as increase in oil and commodity prices within and abroad, which makes inflation in Pakistan dependent on monetary as well as non-monetary factors.

Chaudhry and Choudhary (2006) suggest that *“Pakistan’s economy is operating at a very horizontal portion of the supply curve and the major cause of inflation is an increase in import prices, not in the mismanagement of monetary policies. They indicate that the growth rate of import prices is the most important determinant of inflation in Pakistan, both in the short run and long run, which is followed by growth rate of output”*.

### **III.b.7 Financial System Strength**

The last but not the least precondition for the adoption of IT is the strength of financial system. A healthy financial system not only minimizes potential conflicts that may arise between economic stability objective and financial stability objective but also guarantees effective and smooth transmission of monetary policy. Financial stability is vital for the eventual success of any monetary policy as in the case of fragile financial system, central bank may become overly constraint whenever there is a need to increase interest rate to tighten monetary policy as this increase may result into contraction of the balance sheet of financial institutions. In addition to this, more developed or sophisticated the financial system of a country is, the more a central bank will place emphasis on inflation control and macroeconomic outlook.

According to IMF World Economic Outlook of October, 2005, the strength of financial system in Pakistan is noteworthy. The strength has been measured using different indicators such as measures of financial market depth (private-bond-issuance-to-GDP, ratios of stock-market-capitalization-to-GDP, and stock market turnover, or the maximum maturity of actively-traded nominal bonds, and the extent of banks’ foreign currency open positions) and risk weighted

capital adequacy ratio. Table 4 shows that Pakistan performs better than its peers and scored 0.5 which is equal to the average score of industrial countries.

Table 4	
	Financial System Health <sup>5</sup>
Average of Industrial Economies	0.5
Average of Emerging Economies	0.4
Pakistan	0.5

Source: Zaidi (2006)

An important factor behind this favorable result is the comprehensive financial sector reforms of late 1980s resulting in a healthier and more competitive banking system (Zaidi, 2006).

### c. A Royal flush or A Seven-Deuce Offsuit?

In the following table 5 we present the summarize results of above mentioned analysis along with the status of each pre-requisites based of course on the available information and the judgments which could be different from other researchers.

Table 5		
Pre - Requisite	Status	Comment
Independence of SBP	Partial	SBP has <i>de jure</i> independence but when it comes to operationalizing monetary policy actions it doesn't have much political independence.
Transparency of Information	Partial	SBP is partially transparent, as it has started to provide some information on economic state but it does not provide information on ex ante or proactive basis that is required for pre-commitment to inflation target.
Fiscal Discipline	No	This condition is not met entirely. There is no coordination between fiscal and monetary authorities and fiscal gap has always been negative in the history of Pakistan.
Floating exchange rate	No	Although, SBP claims that it has adopted floating exchange rate regime but <i>de facto</i> regime of Pakistan is pegged exchange rate as indicated by IMF.
Moderate or low Debt level	No	The government borrowings are on increasing trend in Pakistan and this problem has become more severe since the last decade.
Sufficient foreign reserves	No (at least presently)	The reserves condition has always been dissatisfactory in Pakistan except for the period 2000-2007. The present data also indicates downward trend in reserves.
Demand side dominance	No	Pakistan's economy is also characterized by supply side shocks and heavily dependent on imports and oil prices.
Financial system strength	Yes	Pakistan's economy is bank-based as opposed to market-based. Although, the reforms of 1990s have strengthen the banking sector but still there is a need for more maturity and depth, as the sector boom could be the result of a credit bubble.

<sup>5</sup> IMF staff calculations, source Zaidi (2006)

All indicators and pre-requisites lead to the reservations about Inflation Targeting framework in Pakistan. IT requires that central banks should refrain from using any other nominal anchor but all the indicators in Pakistan suggest that inflation targeting cannot be the sole objective of SBP. SBP cannot ignore the issue of fiscal deficit, high government borrowing, current situation of falling reserves, large swings in exchange rate, depreciating rupee and the supply side shocks due to high increase in consumer and oil prices. All these issues require SBP's prime attention thus hampering its commitment towards the single nominal anchor of inflation and metaphorically putting it in the situation of having a worst possible hand in Poker of "Seven-Deuce Offsuit".

#### **IV: Econometric Assessment**

An implicit condition to pursue IT is that there should be a stable and significant relationship between the measure of inflation to be controlled and the short term interest rate. Short term interest rate is the major tool used by central banks for the transmission of monetary policy, and low / stable inflation is their final objective. Interest rate can influence inflation through cost of capital channel, exchange rate channel, and wealth effect channel; but here we are interested in only in the causality of short term interest rate on inflation measure, rather than in a particular transmission channel because this causality is indeed important in the subsequent success of IT.

##### **IV.a Data, Methodology and Results**

The essence of inflation targeting framework is that interest rate should be used to correct the deviation of actual inflation from the target. By using *Granger - Causality* test we intent to investigate that interest rate Granger - cause inflation measure in Pakistan or not. Equation 1 below expresses the general form of this causality:

$$y_t = \alpha_0 + \alpha_1 y_{t-1} + \dots + \alpha_n y_{t-n} + \beta_1 x_{t-1} + \dots + \beta_n x_{t-n} + \varepsilon_t \quad \text{Equation 1}$$

Since the Granger causality test is relevant only when the variables involved are either stationary or non-stationary but co-integrated (Granger 1988a); therefore the methodology of the empirical work in this paper is as follows:

- Tests for Stationarity
- Tests for Co-Integration: Engle Granger Approach
- Tests for Co-Integration: Johansen and Juselius Approach
- Granger - Causality Test

We used quarterly data from 1976 - 2007 from the database of International Financial Statistics (IFS). The reason to drop the data before this time period was the separation of East Pakistan and other major political disturbances in 1971 that had caused major shift in the economy and

financial structure of Pakistan, and due to which the economy had been remained turbulent upto 1975. The variables used in this analysis are as follows:

- INF= Inflation based on Consumer Price index of 12 major cities (Base = 2000)
- PR = Policy Rate (Discount rate used by SBP as a primary monetary tool)
- XRG = Exchange rate growth (Appreciation/Depreciation of PKR/USD, period average)
- M1G = Growth rate of Narrow money

The major advantage of using quarterly data is its additional relevance and usability in the context of less developed countries as observed by Ryan and Milne (1994). We calculated quarterly growth rates of CPI-12 Major Cities, Exchange rate(PKR/USD) and M1 (Narrow Money) on Year-on-Year basis by taking fourth lagged difference of their natural logarithms. In other words we calculated the annual percentage change in concerned variable with its value from the corresponding quarter in previous year.

This percentage change will serve as INF, XRG and M1G respectively where INF is the principal variable of interest and PR, XRG and M1G will act as the anchors of inflation targeting, exchange rate targeting, and monetary aggregate targeting respectively. The relationship of each anchor with the ultimate objective of low inflation has been estimated in the following paragraph.

#### IV.b Test for Stationarity

Phillips-Perron test; a test for non-stationarity has been employed on all variables. It can be seen from table 6 below that we can reject the null of unit root at 1 percent significance only in the case of M1 growth rate whereas all other variables are found having unit root i.e. they are non-stationary. However the first differences of all variables are stationary at 5 percent or low level of significance.

Table 6			
Variables	PP - Statistics	Variables	PP - Statistics
INF	-2.763065*	$\Delta$ INF	-9.153139***
PR	-1.745847	$\Delta$ PR	-9.935687***
XRG	-2.569599	$\Delta$ XRG	-9.462074***
M1G	-5.429246***	$\Delta$ M1G	-25.87351***

Note:\*\*\*, \*\*, \* respectively indicates rejection of the null at 1%, 5% and 10% significance levels.

#### IV.c Test for Co-Integration

The real purpose of any econometric model is to develop a relationship between economic variables but that relationship could be spurious in the presence of non-stationarity of the variables. PP test above indicates that all the variables are stationary at first difference except M1G. In this scenario, a meaningful relationship can only be established between the variables if they are co-integrated (Granger, 1986; Engle and Granger, 1987).

To identify the co-integration relationship between INF and all other variables i.e: PR, XRG and M1G, we used Engle – Granger approach at first. The co-integration will be checked by running a regression of variables and then by conducting the stationarity test on its residuals. If the residuals are found stationary, it indicates that the variables are co-integrated and there exists a long run relationship. Estimated bivariate regressions are represented by equation 2,3 and 4 where dependent variable INF is same and independent variable is one of the three anchors (PR, XRG, M1G) each representing three different monetary policy regimes. We also introduced a multivariate regression (equation 5) containing all three anchors simultaneously.

$$INF = c + \alpha PR + \varepsilon \quad \text{Equation 2}$$

$$INF = c + \alpha XRG + \varepsilon \quad \text{Equation 3}$$

$$INF = c + \alpha M1G + \varepsilon \quad \text{Equation 4}$$

$$INF = c + \alpha_1 PR + \alpha_2 XRG + \alpha_3 M1G + \varepsilon \quad \text{Equation 5}$$

The results of three bivariate regressions are summarized in table 7 below revealing the following observations:

Table 7				
Variables	Co-efficient	Standard Error	Test -Statistic	Prob.
<b>1. INF and PR</b>				
c	4.211773***	1.022513	4.119040	0.0001
PR	0.289890***	0.089293	3.246511	0.0015
PP Test on Residuals of Equation 2			-2.891277**	0.0493
<b>2. INF and XRG</b>				
c	7.609482***	0.367919	20.68250	0.0000
XRG	-0.031907	0.042754	-0.746293	0.4569
PP Test on Residuals of Equation 3			-2.750284*	0.0686
<b>3. INF and M1G</b>				
c	7.071375***	0.749468	9.435187	0.0000
M1G	0.025416	0.050565	0.502637	0.6161
PP Test on Residuals of Equation 4			-2.778932*	0.0643

Note:\*\*\*,\*\*,\* respectively indicates rejection of the null at 1%, 5% and 10% significance levels.

- INF and PR are co-integrated of level one because we can reject the null hypothesis of unit root for the residuals of equation 2 at less than 5 percent level of significance. The coefficient of PR in co-integration vector is though significant but showing positive sign which is contrary to theoretical and historical expectations, thus suggesting that PR does not have an ability to affect INF in the same way as monetary authorities intend.
- PP test on the residuals of equation 3 shows that though we cannot reject the existence of co-integration between INF and XRG at 10% level of significance. However the negative sign of XRG in equation 3 indicates that positive growth (depreciation of PKR against USD) helps in



reducing inflation which is as surprisingly contrary to the expectations as we have already observed in the case of relationship between INF and PR.

- There is a possibility that *INF* and *M1G* are also co-integrated as the null of unit root is rejected at 10% significance level; but again the coefficient of *M1G*, despite being positive, is insignificant thus showing its inability to play any meaningful role in containing inflation in long run.

Table 8				
Variables	Co-efficient	Standard Error	Test -Statistic	Prob. (P-val.)
C	1.707199	1.527858	1.117381	0.2661
PR	0.453631***	0.102026	4.446238	0.0000
XRG	-0.098318**	0.045022	-2.183799	0.0309
M1G	0.091582*	0.052683	1.738356	0.0847
Tests for Non Stationarity on Residuals of Equation 5				
Phillips-Perron Test			-3.137852**	0.0264

Note:\*\*\*, \*\*, \* respectively indicates rejection of the null at 1%, 5% and 10% significance levels.

The results of multivariate regression estimated as equation 5, presented in table 8 above, demonstrate that there is an evidence of significant long run co-integration relationship among the variables as the residuals are stationary at almost 2% level of significance according to PP test. All co-efficients are significant at 10 percent or low, but the positive sign of PR as opposed to negative expected sign still questions its importance while formulating policy decisions regarding inflation.

#### IV.d Test for Cointegration – Johansen and Juselius Approach

Due to the shortcomings of EG approach when more than one cointegration relationship exists we further extended our analysis to the use of VAR based cointegration test following the framework and methodology developed by Johansen and Juselius (1991, 1995).

Consider a VAR of order p

$$y_t = A_1 y_{t-1} + \dots + A_p y_{t-p} + B x_t + \epsilon_t \quad \text{Equation 6}$$

Where  $y_t$  is a k-vector of non-stationary I(1) variables,  $x_t$  is a d vector of deterministic variables and  $\epsilon_t$  is a vector of innovations. This VAR could be rewritten as

$$\Delta y_t = \Pi y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta y_{t-i} + B x_t + \epsilon_t \quad \text{Equation 7}$$

$$\text{Where } \Pi = \sum_{i=1}^{p-1} A_i - I, \quad \Gamma_i = -\sum_{j=i+1}^p A_j$$

We used two different specifications of Johansen's test, one is with intercept and the second is with both intercept and trend terms in cointegrating equations (results not reported here),

simultaneously allowing for linear deterministic trend in data for both specifications. The difference in specifications does not change our results.

Trace statistics and maximum eigenvalue statistics calculated according to equation 8 and 9 are reported in table 9:

$$LR_{tr}(r|k) = -T \sum_{i=r+1}^k \log(1 - \lambda_i) \quad \text{Equation 8}$$

$$LR_{max}(r|r + 1) = -T \log(1 - \lambda_{r+1}) = LR_{tr}(r|k) - LR_{tr}(r + 1|k) \quad \text{Equation 9}$$

Table 9					
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic		Max-Eigen Statistic	
		$\lambda_{trace}$	Prob.**	$\lambda_{max}$	Prob.**
None *	0.269374	82.50202	0.0000	37.97625	0.0016
At most 1 *	0.171091	44.52576	0.0005	22.70503	0.0298
At most 2 *	0.139826	21.82073	0.0049	18.22506	0.0112
At most 3	0.029279	3.595677	0.0579	3.595677	0.0579

Table 9 indicates that according to both trace and max statistics the null of no cointegration relationship is rejected and we can proceed up to the acceptance of two cointegration relationships at 5 percent level of significance. The normalized cointegrating coefficients provided by Johansen’s test are reported in table 10 below.

Table 10		
Variables	Co-efficient	Standard Error
PR	0.427082	0.29257
XRG	0.581697***	0.14816
M1G	0.991806***	0.19059

The above results are consistent with EG approach as far as the sign of PR is concerned thus conforming us about the long run “positive” relationship between policy rate and inflation. This conclusion further reinforces us to believe that policy rate cannot be used as a suitable anchor to target inflation in long run which is explicitly required by the inflation targeting framework. Positive signs and significant values of coefficients of XRG and M1G support not only the present practice of monetary aggregate targeting by SBP but indicate that the exchange rate targeting could be another viable solution to stabilize inflation as believed by many researchers.

**IV.e Granger – Causality Test**

Inflation targeting framework requires that whenever there is a deviation of inflation from its target, we must use interest rate to correct it. Interest rate can influence inflation and its behavior only if it has the ability to Granger cause inflation. The results of Granger – Causality

tests between INF and PR are provided in table 11. The maximum lag length is six. This is because the frequency of data is quarterly and six lags allow us to look sufficiently for the impact of policy anchor on Inflation.

<b>Table 11</b>						
Lags	<b>PR and INF</b>		<b>MIG and INF</b>		<b>XRG and INF</b>	
	<i>PR does not cause INF</i>	<i>INF does not cause PR</i>	<i>MIG does not cause INF</i>	<i>INF does not cause MIG</i>	<i>XRG does not cause INF</i>	<i>INF does not cause XRG</i>
1	0.88797	10.2621***	3.55603*	0.34824	1.83792	4.06033**
2	1.48705	3.78914**	2.69644*	0.39464	1.79348	1.97912
3	0.79772	2.91086**	1.84064	0.55833	0.99323	1.42825
4	0.91607	1.92303	1.72427	0.45566	0.97093	1.23869
5	1.28657	1.41905	3.04773**	0.95606	1.61360	1.08389
6	0.93968	1.24934	2.48110**	0.84166	1.28282	0.88718

Note:\*\*\*,\*\*,\* respectively indicates rejection of the null at 1%, 5% and 10% significance levels.

The results force us to infer that interest rate and exchange rate are not very much effective in influencing the behavior of inflation and instead PR and XRG are being caused by INF. However we can say that M1G is able to affect INF up to 6 lags which is also somewhat consistent with the findings of Khalid (2005) who found that M1 granger causes INF at 3<sup>rd</sup> lag.

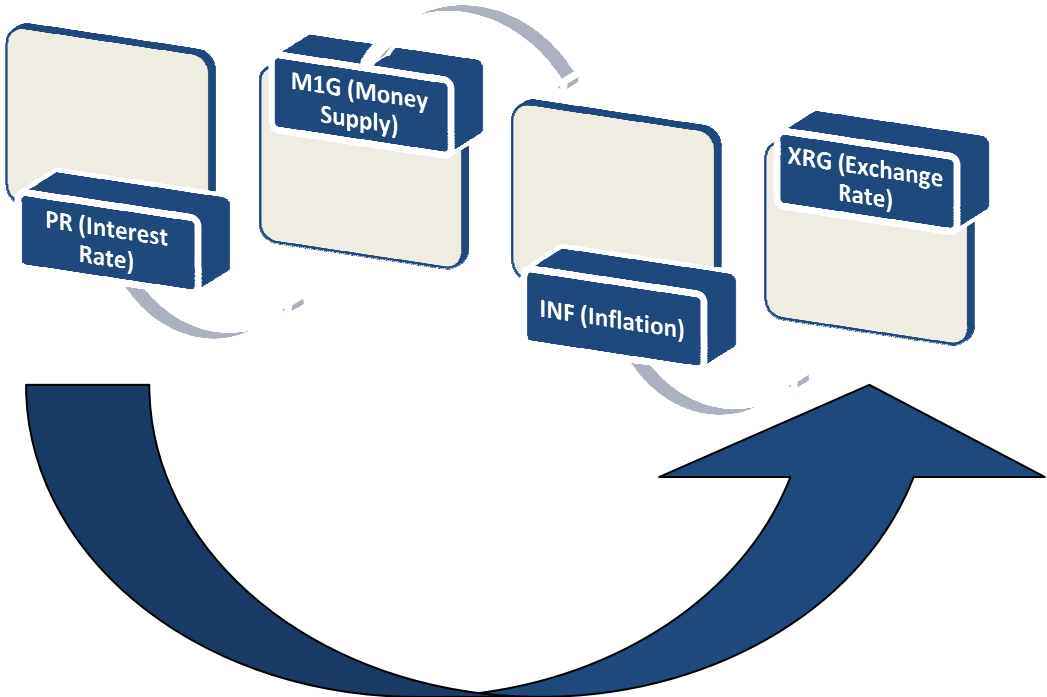
As PR does not seem to be affecting inflation directly even up to six lags we analyze further what PR is capable of influencing. We check the direction of causality of PR to M1G and PR to XRG and the results are shown in table 12 clearly indicate that interest rate has an influence on narrow money thus showing its importance in an overall monetary policy by influencing inflation indirectly through money supply (Table 11).

<b>Table 12</b>				
Lags	<b>PR and MIG</b>		<b>PR and XRG</b>	
	<i>MIG does not cause PR</i>	<i>PR does not cause MIG</i>	<i>XRG does not cause PR</i>	<i>PR does not cause XRG</i>
1	0.09594	5.07934**	0.50034	1.17508
2	0.33712	2.92512*	0.51479	4.18419**
3	0.50003	3.85172**	0.94424	4.11643***
4	0.96001	5.49555***	1.79100	2.96494**
5	3.02597**	3.35722***	3.55624***	1.00611
6	3.17425***	3.02668***	3.09913***	0.62778

Note:\*\*\*,\*\*,\* respectively indicates rejection of the null at 1%, 5% and 10% significance levels.

We would also like to highlight two interesting results that we get from Granger Causality test about the relationship between INF and XRG (table 11) and between PR and XRG (table 12). These results indicate that interest rate not only affect exchange rate directly but also indirectly through the channel of money supply and inflation. All these relationships can be explained clearly with the help of following figure 4:

**Figure 4**  
**Observed Monetary Policy Transmission Channel in Pakistan**



Although, there may be some limitations in our analysis, but we can interpret these results in line with Lucas (2001), who is of the view: *“In the theory of inflation, consistent with much of the evidence, interest rates play no role whatsoever”*.

This rule seems to be applying in Pakistan; and if Pakistan adopts Inflation Targeting then inflation would not be sensitive to the movements in the interest rate directly. We can also interpret these results in the manner that “Granger Causality test provides support for using interest rate as an instrument to influence money supply, that subsequently Granger Cause inflation”.

## **V: Conclusion**

Success in Poker significantly depends on the ranking of the hand (combination of cards) a participant starts with. Odds in favor of success or a reasonable performance are very low with a seven-deuce offsuit which is unanimously considered as the worst possible hand in this game. We fear that metaphorically Pakistan is also having the seven-deuce offsuit when it applies on the decision of opting or not the inflation targeting framework. We qualitatively assess the applicability of Inflation Targeting framework in Pakistan by evaluating it on the basis of necessary economic and institutional structure required and our analysis shows that most of the pre-conditions of Inflation Targeting are weak or non-existent and thus suggests that Inflation cannot be the sole objective of State Bank of Pakistan. SBP cannot ignore the issues of fiscal deficit; high government borrowing; current situation of falling reserves; large swings in exchange rate; depreciating rupee and the supply side shocks. We also quantitatively assess the significance and role of short term interest rate in the monetary policy transmission mechanism and we came to this conclusion that short term interest rate has no role in affecting inflation directly; however it can affect inflation through the money supply channel. The absence of direct link between interest rate and inflation is contrary to the essence of IT framework which requires that interest rate should be the sole anchor in targeting inflation. These findings compel us to believe that neither Pakistan is ready to adopt inflation targeting, due to the absence of pre-conditions required; nor it can control inflation directly through interest rate measure, which is the basic premise of inflation targeting framework, even if it decides to adopt it.

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