

Determinants of Inflation and Feasibility of Inflation Targeting in a Small Emerging Market Economy: The Case of Pakistan

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Abstract

The successes of inflation targeting monetary policies in established market economies have generated an interest among policy makers in some emerging market economies to explore the feasibility of adopting the same in order to overcome the recent inflationary trends. Using the data for Pakistan, this study investigates some important issues that the monetary authorities must consider before adopting a policy of targeting the inflation rate. In doing so, Pakistan's record of economic policy and performance during the period 1973-2005 is reviewed in relation to changes in economic policy and political regimes. The time series data on money supply (as an indicator of monetary policy), and budget deficits (as an indicator of fiscal policy) reflect significant changes that have taken place in the recent past. These changes include several market-based financial sector reforms that have taken place in Pakistan since the mid-1990s. As a part of these reforms, greater transparency has also been introduced in the operations of the central bank, the State Bank of Pakistan (SBP). The decline in fiscal deficit has also increased the independence of SBP in the conduct of monetary policy. The changes of government and the central bank's governor in 1999, and a move towards greater flexibility of foreign exchange rate may also have caused the changes reflected in the time series data.

In order to assess the feasibility of adopting an inflation targeting monetary policy in Pakistan, the determinants of inflation and output cost of inflation targeting are analyzed using econometric models. A model of general price level that incorporates lag adjustments is developed and estimated using quarterly data for the period 1982-2004. Two versions of the model are estimated using CPI and WPI as measures of general price level. The results indicate that the foreign price level of imports, money supply, and domestic output level are statistically significant determinants of the general price level. The exchange rate is not statistically significant as a determinant. The effect of money supply on wholesale prices increased in 2000 while the impact on consumer prices remained the same throughout the period. However, the elasticity of the general price level with respect to money supply is relatively smaller than the elasticity with respect to foreign prices of imports in both the CPI and WPI versions of the model. The lags in adjustments of the price level are high and statistically significant in both WPI and CPI models. The SBP cannot control foreign prices of imports or lag adjustments and hence substantial changes in them can result in missing any target rate of inflation. Given its small impact on the price level, monetary growth rate would have to be adjusted by large magnitudes each time the target is missed in Pakistan. This could lead to uncertainty and economic instability undermining the credibility of monetary policy.

Estimates of output-inflation tradeoff indicate that a reduction of inflation rate to its 2000-2003 average of 3.4 percent per annum would result in a cumulative output loss of about 5.1 percent, which could mean a negative economic growth in the short run.

Among the findings of the present study the lack of exchange rate pass through stands in favour of inflation targeting. However, the other findings including the significance of imported inflation, relatively low impact of monetary policy on inflation, importance in lag adjustments in price level, and the strong likelihood of considerable loss of output and negative economic growth at the initial phase raise concerns about the feasibility and effectiveness of inflation targeting.

Finally, evidence presented in this study also suggests that political stability / continuity as well as better functioning markets are essential pre-requisites for achieving the desired effects of any macroeconomic policy.

I. Introduction

In recent years, several developing countries have adopted structural reforms that have enhanced the role of markets in their economies. Fiscal consolidation has also cleared the way for their central banks to adopt independent monetary instruments to conduct monetary policy. The apparent success of inflation targeting in established market economies has generated an interest among monetary policymakers in these emerging market economies to explore the adoption of inflation rate targeting, to cope with internal economic realities such as high rates of inflation and their consequences. The effectiveness of inflation rate targeting as a policy depends not only on the extent to which the authorities can influence the rate of inflation through money supply but also on the relative strength of other internal and external factors affecting inflation.

The present study investigates possible determinants of inflation and also assesses the feasibility of an inflation rate targeting monetary policy in small emerging market economies by considering the case of Pakistan, whose financial sector has adopted several market based reforms in recent years. The objectives of the study are achieved by 1) reviewing the country's past macroeconomic policy experiences in the context of political and global environment, 2) estimating econometric models of general price level and inflation – output tradeoff and 3) by analyzing implications for an inflation rate targeting policy based on the model estimates. The study is timely and important for several reasons. First, the recent increases in the annual rates of inflation in emerging market economies have become of great concern to their monetary policymakers. In Pakistan, inflation rate exceeded 9 percent in 2004-2005. The country's central bank, State Bank of Pakistan (SBP), has come under public criticism for adopting an expansionary monetary policy which may have been a contributing factor.¹ Second, due to budgetary consolidation, Pakistan's fiscal policy has become less expansionary in recent years, thereby increasing the country's reliance on private sector for economic growth. If this trend continues, the monetary policy will gain even greater importance in provision of liquidity to the private sector for future economic expansion, thereby making SBP more vulnerable to public criticisms in the event of a price instability and inflation. Hence, it is important to determine the extent to which monetary policy is able to influence inflation rates in Pakistan through the changes in money supply. Third, using Pakistan as an example, the results of the present study can also contribute to the ongoing debate on choice of inflation rate as an appropriate intermediate target of monetary policy in small emerging market economies.² The choice of inflation rate target requires an enhanced role of market-based monetary policy and a high degree of independence of central banks. The recent monetary sector reforms and diminishing role of fiscal policy suggest that time has come to carefully examine the feasibility of adopting inflation rate as an intermediate target of monetary policy in Pakistan.

The effectiveness of monetary policy in influencing economic growth and price level in a developing country, where markets have not yet completely developed, has been a contentious issue. Based on empirical research many economists have argued that presence of unorganized

¹ For example, please see Akhtar (2004).

² The debate over choice of intermediate monetary targets also involves choice of exchange rate as an alternative intermediate target. However that discussion is beyond the scope of this paper. Petursson (2000) provides a good review of the issues involved with the two monetary policy regimes, i.e., inflation rate targeting and exchange rate targeting.

financial institutions, a lack of direct relationship between interest rates and investments, and poor governance render monetary policy ineffective in influencing economic growth and price level in a developing country (World Bank, 1991; Fry, 1988; Jones and Khilji, 1988; Pasha, Hasan and Khan, 1995).³ Despite their limitations, these unorganized financial institutions remain an integral component of the general economic system in such a country. Hence, they represent a key element in the overall stabilization programs of the International Monetary Fund (IMF) and the World Bank.⁴

The paper is organized as follows. Section II provides a broad overview of the macroeconomic policies of Pakistan for the period 1973-2005. To shed some light on the history of possible impacts of changing political environments, we present the macroeconomic policy review in relation to the political regime in place. An independent central bank is essential for successful operation of a market based monetary policy. Therefore, we also present the reader with some broad idea of the degree of political independence of SBP. Section III reviews two important macroeconomic performance indicators, growth in Gross Domestic Product (GDP) and inflation rate in relation to the discussion in section II. Section IV develops an econometric model of general price level and also describes the data used for its estimation. Section V discusses the results of estimated model. Section VI discusses the implications of model results for the adoption of an inflation targeting monetary policy. Section VII presents conclusions of the study and directions for future research.

II. Broad overview of Pakistan's macroeconomic policies (1973-2005):

The major goals of any country's macroeconomic policies should include the promotion of economic growth rate, smoothing out of avoidable business cycle fluctuations, maintaining low rates of unemployment as well as maintaining price stability and low inflation. Practical experiences of many countries show that the political context has been a significant determinant of the changes and outcomes of macroeconomic policies. The political uncertainties in particular have caused greater volatility in emerging market economies than in established market economies. Calvo and Mishkin's (2003) analysis suggests that the resulting lack of credible fiscal and monetary institutions has rendered the macroeconomic policies irrelevant in many such economies. To predict the outcomes of current market-based initiatives, it is important to take Pakistan's political context into account for a better understanding of the changes in its macroeconomic policy regimes and their outcomes. We also believe that the governance of financial and fiscal institutions of a country is affected by the political environment.

Over the past three decades, Pakistan has experienced five civilian and two military governments. The first civilian government of the Pakistan Peoples Party (PPP) took office in 1972 and continued until 1977. The military takeover that took place in 1977 continued until 1988. Between 1988 and 1999, the country experienced four changes in its civilian rule: 1988-90, PPP; 1990-93, Pakistan Muslim League (PML); 1993-97, PPP; 1997-99, PML. Each of these civilian governments was removed by the office of the President of Pakistan on charges of

³ For a review of literature on monetary policy issues relevant to Pakistan, please see Zaidi (1999).

⁴ Financial systems provide a variety of needed services including mobilization of savings, risk limitations, credit allocation, foreign exchange trading, etc.

corruption. The present military government took over from the PML government in 1999. Military governments have stayed longer in power than any single civilian government. Hence, one may characterize a military government rule as one of political continuity / stability which has strong influence on the functioning of economic institutions as well as on the economy. The military governments and the PML governments have generally favored a market based economic system while the PPP governments have favored greater government involvement in the economy.

We will divide the time period of our macroeconomic policy review (1973–2005) broadly according to military and civilian governments.

Fiscal policy (1973 – 2005)

Fiscal policy played a dominant role in achieving macroeconomic objectives of Pakistan during most of the period under study. A summary of the fiscal policy record of the country during this period is presented in Figure 1. The figure shows how the levels of government revenues and expenditures and the budget balance as percentages of GDP have changed over time during the period under study.

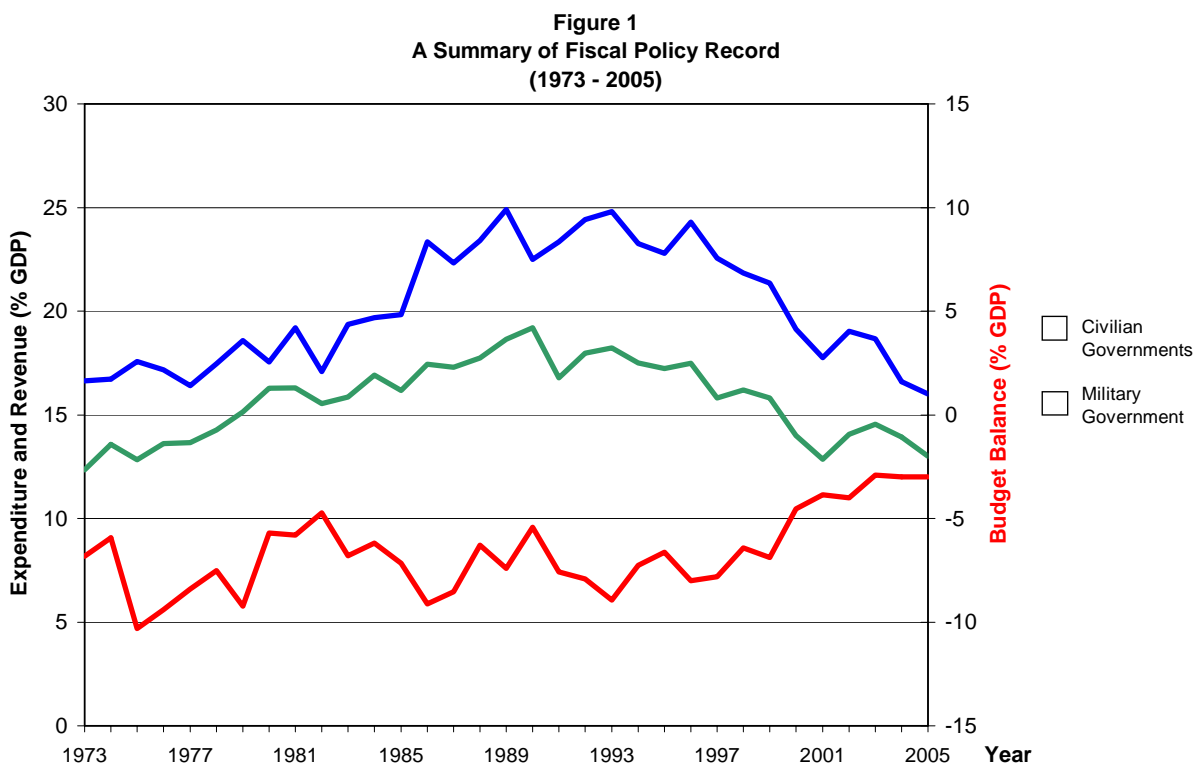
During the rein of the first civilian government that ended in 1977, the country experienced significant political and economic instability. It had just broken up, and was experiencing difficulties of political re-organization in a time when the OPEC oil embargo was already hurting the global economy. The decrease in economic growth rate from about 7 percent to just over 4 percent during this period may have been partially responsible for the decline in government revenues. However, government expenditures remained stable during this period in relation to the GDP. Budget deficit reached a peak of about ten percent of GDP at one point.

Government expenditures kept rising during the military regime of the period 1977 to 1988, with a higher pace in the eighties. Revenues also rose during this period but at a slower pace so that the deficits never fell below 5 percent of the GDP. In fact at two times during that military regime, deficits rose to about 10 percent of the GDP. Economic growth was high during this period, remaining close to 7 percent most of the time, but was unstable (Figure 3). Fiscal policy was expansionary

During the period from 1988 to 1999, the country experienced four changes in civilian governments. Until 1993, when the country had the first PPP government (1988 to 1990) and the first PML government (1990-1993), government expenditures remained high, at about 10 percent of the GDP. Revenues also fell slightly but fiscal policy continued to be expansionary. Since 1993, we observe a declining trend in government expenditures as well as in revenues. The budget deficit had started to shrink even before the present military government took over. This decline in government budget deficit perhaps also reflects the macroeconomic adjustments that the country undertook under the IMF restructuring program. Fiscal policy became relatively less expansionary during this period.

The decline in government expenditures became sharper after the present military government took office of the chief executive of the country. Since then, revenues also declined at a faster rate but the decline in revenues was not as sharp as it was in expenditures so that the budget deficit as a percentage of GDP declined sharply from about 7 percent in 1999 to about 3 percent in 2005. Fiscal policy has clearly become less expansionary.

On the basis of the trends that we observed above, it appears that deliberate attempts to control fiscal deficit in Pakistan started only from 1993 when expenditures were cut. Until 1999, fiscal deficit remained above 5 percent of the GDP, but declined more rapidly over the six years of present government. This reflects the government’s resolve to reduce fiscal deficit to zero by the year 2007 and maintain a surplus thereafter. Fiscal policy is expected to remain less expansionary in the near future.



Source: International Financial Statistics (Electronic Database) and Government of Pakistan (2005).

Source: Based on International Financial Statistics (IFS, electronic files). The 2005 data are based on Government of Pakistan (2005).⁵

Monetary Policy (1973-2005)

A broad measure of monetary policy is the growth rate of M2 which provides a broad indication of the influence of monetary policy on aggregate demand in the country.⁶ Trends in

⁵ Figures 1 and 2 are similar to the graphs in Parkin and Bade (2004) presented for Canada.

⁶ Data on M2 are obtained as the total of “Money” and “Quasi Money”, from the IFS sheet on Pakistan (lines 34 and 35). These data differ from the data on M2 reported in State Bank’s *Statistical*

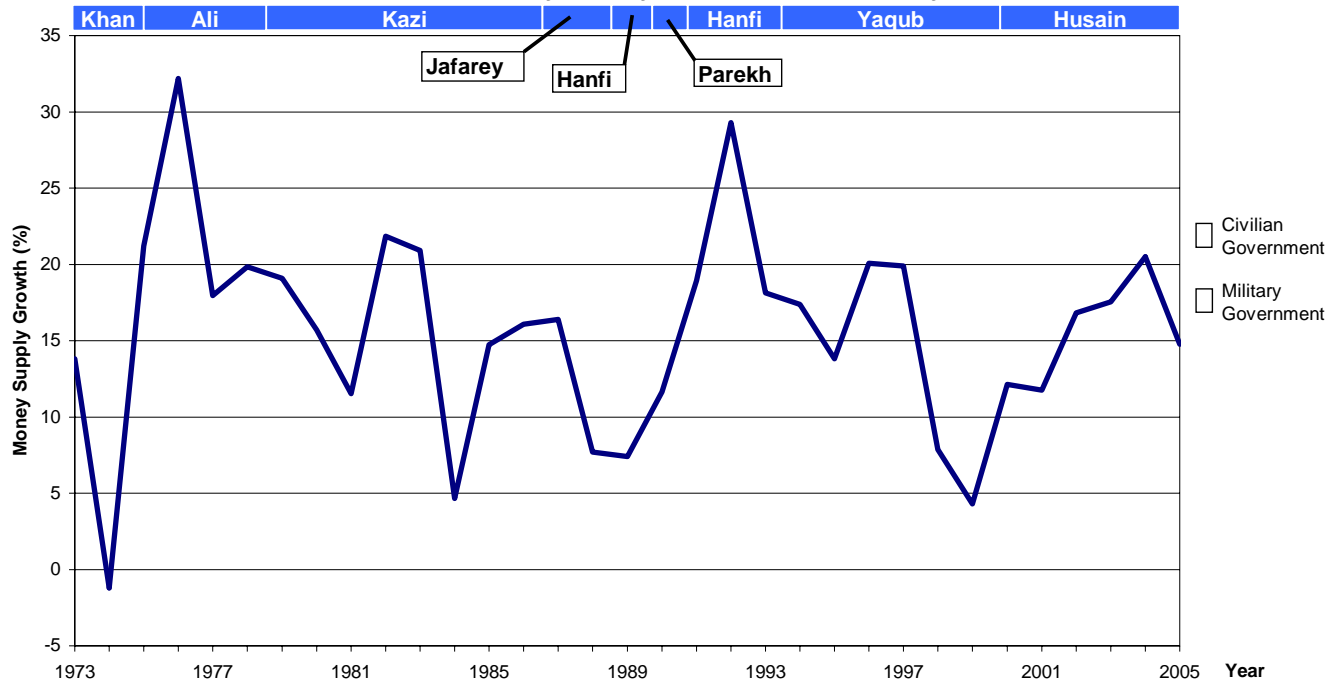
monetary growth rates are displayed in Figure 2 which, in addition to the political regimes, also identifies the SBP governors. This identification has been made to provide some broad idea of the political independence of SBP which is essential for successful operation of its monetary policy. One of the criteria for measuring the political independence of a central bank is the procedure for appointment and removal of its governor. Central banks with little government involvement in appointing and removing their governors are considered more politically independent.⁷

The SBP governor is appointed by the President of Pakistan for a three year term and may be re-appointed for another three years. As shown, the SBP governors have changed nine times during the period under review. However, the appointment of a governor did not always coincide with the start of a new military or civilian government. In fact, there is also an example whereby one governor, Mr. Hanfi, appointed during the PPP government left office for one year when that government was dissolved but returned to office during the new PML government within one year. Mr. Yaqub was appointed as the new governor in 1994 when a PPP government was ruling the country. He continued to be the governor during the second PML government. The present governor, Dr. Hussain, was appointed at the start of the present military government. However, his appointment appears to be a coincidence since Mr. Yaqub had finished his two terms. One may thus conclude that on the basis of the criterion for appointment and removal of its governor, the SBP appears to be politically independent during the period under review. However, as we will see below, the SBP may not have met another criterion for political independence, i.e, government's control over monetary instrument until 1999.

Bulletin as the International Monetary Fund treats separately the following items: 1) deposits of international non-monetary organizations at the State Bank and the deposits of nonresident non-banks at scheduled banks, 2) counterpart funds, 3) government deposits at scheduled banks, and 4) postal savings deposits. To date, the IFS data are available only until 2004 while the State Bank has recently published provisional figures for 2005 (these run only upto May instead of June). We note that over the past four years, the total of "Money" and "Quasi Money" data exceeded the State Bank's M2 data by an average of about 9 percent. We therefore obtained the 2005 figures by adding about 9 percent to the State Bank's M2 data.

⁷ In a detailed analysis of the independence of a central bank, several measures of its political and economic independence are used. In addition to the procedures for appointment and removal of the governor, other measures of political independence include central bank responsibilities, the procedures for appointing the governing bodies, and the degree of government control over monetary instruments. The economic independence refers to the restrictions on central banks to finance fiscal deficits and to the role they play in banking supervision. For a detailed review of the measures of central bank independence, please see Jacome and Vazquez (2005). These authors also show a negative relationship between legal central bank independence and inflation.

Figure 2
The Monetary Policy Record: A Summary



Source: International Financial Statistics (Electronic Database) and Ministry of Finance

The trends shown in Figure 2 show five distinct phases of monetary policy. In the first phase, between 1973 and 1977, there was a civilian government. Monetary growth was largely rapid.⁸ The monetary expansion of this stage is mainly attributed to internal events such as decline in aid flows and crop failures, as well as external events such as the first oil embargo of 1970s. These events forced the government to resort to deficit financing to correct the fiscal imbalance as reported in Figure 1. The second phase which started with the new military government in 1977 continued until it was terminated in 1989. During that phase, the monetary policy was largely contractionary, however, money supply growth was unstable. The monetary expansion of the early eighties was the result of deficit financing for which government relied heavily on the SBP and on external borrowing. The resultant high inflation rate (about 12.5 percent during 1981 and 1982) and heavy external indebtedness caused the government to start borrowing from non-bank sources during 1983 to 1990. Monetary growth shrunk as a result, bringing inflation under control (6 percent on average). The high fiscal deficit, however, kept SBP vulnerable to political influence. The third phase of monetary policy began in 1989 with the election of the PPP government. Monetary policy became expansionary until 1991 with monetary growth reaching as high as 30 percent in 1991. This monetary growth was essentially to support the high level of government expenditure faced with declining revenues (Figure 1) arising from a lack of domestic resource mobilization and the shortage of foreign loans. In its fourth phase, beginning in 1991, the monetary policy became contractionary with a civilian government still in power (the PML government). This change may be viewed as a consequence

⁸ The negative monetary growth of 1974 coincides with the issuance of new currency notes.

of the IMF stabilization programs that had started to have their impact on the country's fiscal deficits. However, stability of monetary growth remained a challenge, probably again due to disruptions in the availability of foreign funds, time and again, forcing the government to use SBP for financing its budget deficit.

Since 1993, several monetary reforms were introduced through the market-based instruments of monetary management. Increases in reserve requirements, privatization of commercial banks along with stricter monitoring of their credit operations and greater accountability of their chief executives, greater economic autonomy to the SBP, development of secondary markets in government securities, credit control, capital market reforms, better governance, and foreign exchange market reforms are the main features of the monetary reforms. At the same time, measures for greater transparency of SBP's operations have been introduced to enhance the confidence of private sector. For example, the Bank publishes data on its web site that provide updated information on the state of the economy. It also issues a quarterly report and a bi-annual monetary policy statement, one in January and one in July, that describe the state of the economy, the monetary policy targets and the tools used to achieve those targets during the next quarter. The positions of its assets, liabilities, and an annual review of the economy are presented in the Annual Report. The SBP Governor makes frequent speeches before the financial community to provide an informal review of the economy and the directions the Bank wants to take.⁹ The Bank's Board of Directors consists of members from business and government sectors as well as from academic community who come from all four provinces (Arby, 2004). All of these reforms at SBP are likely to raise its credibility in money and foreign exchange markets.

The contractionary tendency of monetary policy that began in 1991 continued until 1999 when the current military government took office. Since then, monetary policy, now in its fifth phase, has been expansionary. However, this last expansionary phase of monetary policy is distinct from the previous two expansionary phases in three respects: 1) it is steady, 2) it has been gradual, and most important 3) this is the first time in Pakistan that an expansionary monetary policy has been adopted not to finance the fiscal deficit but to provide greater liquidity to the private sector.¹⁰

Finally, it is worth-noting that any of the five phases of monetary policy described above can not be associated with the appointment of a new governor. These phases are more related with the change of political regimes in the country.

Several conclusions emerge from the above analysis of the monetary policy record:

1. Until 1999, expansionary monetary policy in Pakistan was used mainly to finance the government's budget deficit. Different phases of contractionary policy were observed when inflation became a concern. This finding suggests that SBP enjoyed a relatively less political and economic independence until 1999

⁹ These speeches are also posted on the Bank's web site.

¹⁰ As noted earlier, fiscal deficits have been on decline since late 1990s.

2. Since 1999, monetary policy has become expansionary and short-term fluctuations in money supply have been dampened. However, this is the first time in the country's history that an expansionary monetary policy has been adopted not to finance the government's budget deficit which is already on decline. On the other hand, monetary policy appears to have taken an expansionary route to provide added liquidity to the private sector. From these trends, it appears that the financial sector reforms that gave greater autonomy to SBP may have allowed it to exercise greater political and economic independence since 1999 that is necessary for an effective monetary policy.
3. The SBP has adopted an expansionary monetary policy despite the decline in demand for liquidity by the government sector that had already made funds available for private sector borrowing.¹¹ A possible reason for taking this route could be that the monetary authorities in the country believe that the time for a "fixed rule" alternative has not yet come and that greater liquidity is needed for expanding private sector investment.

III. The Two Key Macroeconomic Performance Indicators in Pakistan: Economic Growth and Inflation

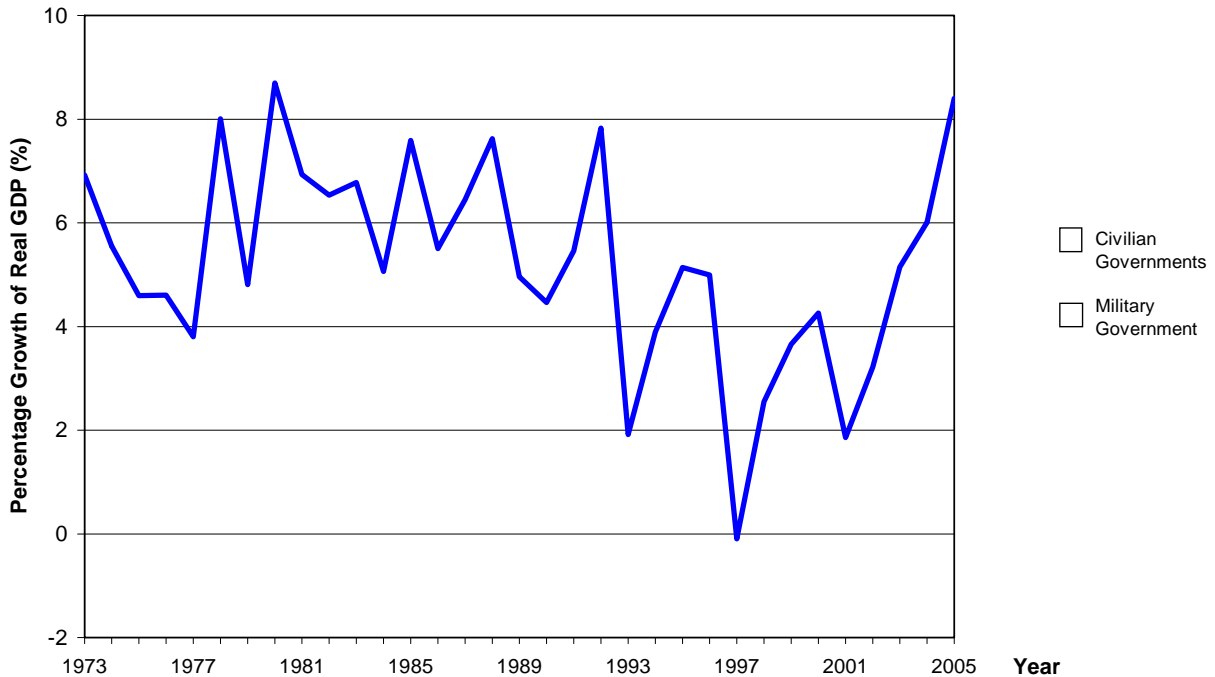
We now turn our attention to the two key macroeconomic performance indicators that a country's monetary and fiscal policies are expected to influence, i.e., economic growth and inflation.

Economic Growth in Pakistan (1973–2005)

The annual economic growth record of the country, as measured by the growth in real GDP, is shown in Figure 3. Economic growth fell significantly from about 7 percent in 1973 to less than 4 percent in 1977. Agricultural and industrial sectors expanded at an average rate of 2.4 percent and 4.8 percent per annum, respectively, during this period (Appendix Table 1). This decline in growth is attributed to many domestic political and international factors. The secession

¹¹ Private sector borrowing increased from 0.5 percent of GDP in 2000 to 5.6 percent of GDP in 2004.

Figure 3
Annual Economic Growth (1973-2005)



Source: International Financial Statistics (Electronic Database) and SBP.

of East Pakistan (now Bangladesh) in 1971; bad crop production due to weather conditions; land reforms; a prolonged recession that engulfed the main commodity-producing sectors (agriculture and manufacturing); the large-scale nationalization of industries and financial institutions in 1972 which shattered investor's confidence; massive devaluation (57%) of currency in 1977; the large-scale nationalization of industries and financial institutions in 1972; the five fold increase in oil prices in 1973 are among the important factors usually held responsible for the economic slowdown. As we have noted in Figure 2, money supply growth during this period remained unstable but was generally expansionary with a view to finance the fiscal deficit of the period.

The economic growth, which declined under the first civilian regime of the period, rebounded with the takeover of the military government in 1977. The policy of gradual decontrol, deregulation and denationalization helped achieve the growth rebound. The agricultural sector grew at a faster pace, on average. The large-scale manufacturing sector registered an annual average growth rate of 8.2 percent. The confidence of the private sector which was shattered in the 1970s as a result of the nationalization policy was restored to a large extent. The private sector investment in large-scale manufacturing as percentage of total private investment more than doubled during the 1980s, rising from about 16.1 percent in 1980-81 to 33.9 percent in 1989-90. Labour and capital productivity, essential for economic growth, grew by an average rate of 8.4 percent and 5.0 percent, respectively. As we noted in Figure 2, the monetary growth during that military regime was generally unstable and contractionary, although some expansionary trend was observed during the early eighties. Economic growth during this

period also fluctuated but remained on a high side, close to 7 percent on average. One may thus conclude that economic growth during the eleven year military rule may not be much attributed to the country's monetary policy. It may rather be attributable to political stability and continuity of that time. Some have also argued that greater export demand led by better economic conditions worldwide since the mid-eighties may have contributed to the growth environment (Iqbal, 1997).

The second civilian governments' era (1988 – 1999) was full of political uncertainties as well as economic mismanagement. Civilian governments were removed four times on the charges of corruption. Economic growth exhibited a long-term declining trend. During the first civilian government of this era (PPP), the economic growth took a severe downturn that continued over its entire two-year rule. During the tenure of next civilian government (PML, 1990-93), economic growth showed some signs of recovery, but remained unstable with large fluctuations in both agriculture and manufacturing sectors. This period also coincides with the recession in world economy that also affected the country's export performance. During the period 1994-97 (second PPP Government of the period) the real GDP growth decelerated to an annual average rate of 4.3 percent with agriculture and large-scale manufacturing registering a growth of 4.4 percent and 1.6 percent, respectively. This deceleration in economic activity was the direct result of stagnation in agriculture and poor performance of manufacturing.

Economic growth took an upturn again when the second PML government took over in 1997. During the entire period of civilian governments (1988 – 1999), the money supply growth rate was unstable (as discussed in previous section), being somewhat higher during the first PML government. The growth record of this period was highly unstable and showed a long-term decline.

Under the present military government, economic growth has shown a consistent upward trend since 2001. The growth rate has exhibited much less fluctuations than in the previous periods, perhaps indicating success in achieving the macroeconomic policy objective of smoothing out cyclical fluctuations in the economy. At the same time, the money supply growth rate (Figure 2) has been increasing consistently, reflecting an expansionary monetary policy which was probably felt necessary due to lack of fiscal stimulus. The growth rate in 2004-05 surpassed 8 percent with agriculture sector recording a 7.5 percent growth, manufacturing sector recording 11.2 percent and large scale manufacturing sector recording 13.6 percent growth. Lorie and Iqbal (2005) have attributed the remarkable growth record in 2003-04 mainly to the growth of domestic consumer demand and private and public investment which in turn are attributed by those authors to the structural reforms that have been taking place in the country since 1990s. However, in the year 2004-05, the national savings and investment rates declined (Appendix 1), but the economic growth remained high (8.4 percent). This high growth rate is attributed to improvements in the productivity of factors of production (Government of Pakistan, 2005). As was shown earlier, (Figure 1), fiscal policy has been less expansionary over this period.

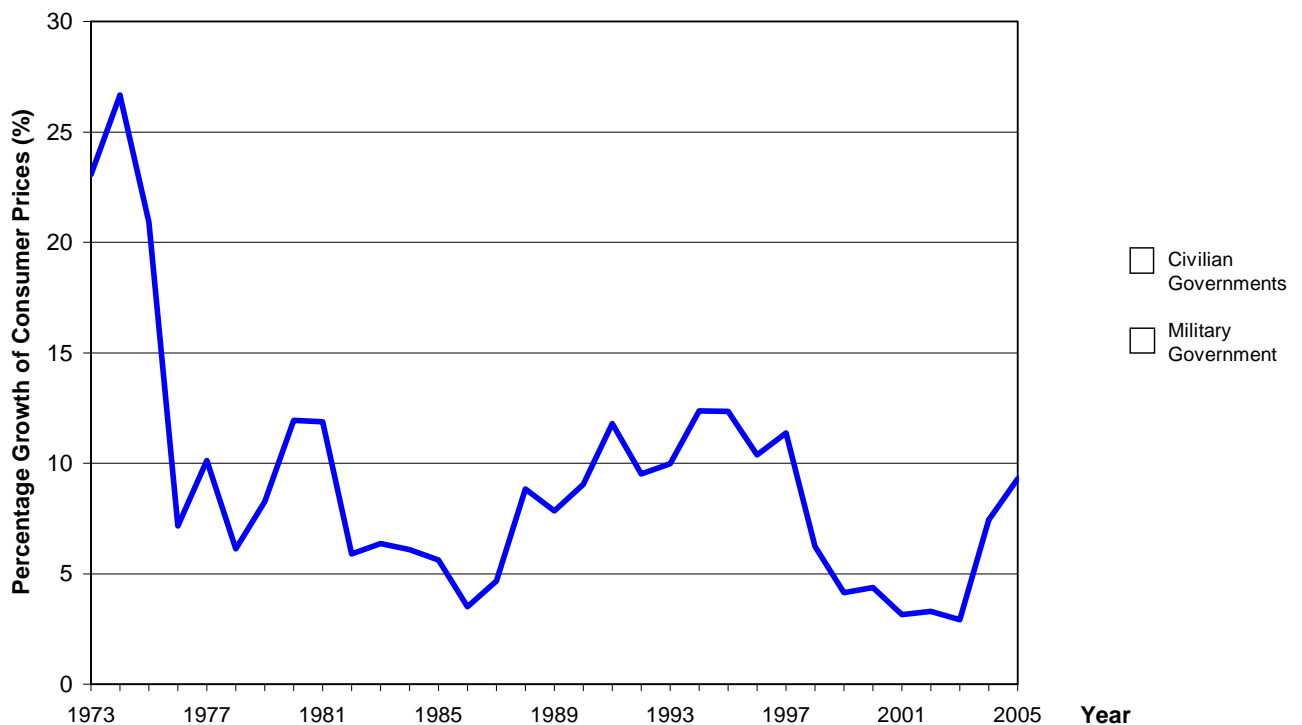
An important conclusion that emerges from our review of the fiscal and monetary policy records and the growth performance of Pakistan is that the continuity and stability of political environment was not sufficient for the success of macroeconomic policies. Greater role of markets, better governance structure and transparency of the policy mechanism must accompany

political stability and continuity. As we noted earlier, Pakistan realized higher economic growth rates during the period 1977-1988 under the military government, but growth rates during that period were not as stable as they are at present. The effects of financial sector reforms and fiscal consolidation that took place in the recent years appear to be clearly present in the recent growth performance of the economy.

We now review the second key performance indicator, i.e., inflation rate in Pakistan.

Inflation in Pakistan (1973-2005)

Figure 4
Annual Inflation Rate in Pakistan (1973-2005)



Source: International Financial Statistics (Electronic Database) and SBP.

Figure 4 displays the behaviour of inflation rate under the civilian and military regimes that existed during the period from 1973 to 2005. The rate of inflation is measured by the growth rate of Consumer Price Index. The first civilian era experienced high inflation rates but this was brought down since 1974, perhaps in part through price controls. Inflation rates followed the monetary contraction of the first military regime and went under 5 percent by 1986 after which monetary expansion caused inflation rate to rise again. The rate of inflation remained mostly high (close to 10 percent) during all civilian governments that came to power during the period from 1988 to 1999. However, the rate did start to come down since 1997. When the present military regime took office, inflation in Pakistan was under 5 percent and the downward trend in

inflation rates continued until 2003. Since then, inflation rate has been on the rise and has recently become of concern to the public and private sectors in the country. As presented in Figure 2, a consistent rise in monetary growth is observed in the country since 1999. However, inflation rates continued to be low until 2003 and picked up only in 2004 and exceeded 9 percent in 2005.

The latest rise in inflation rate has raised concerns among public circles and has been attributed in the news media to the SBP's expansionary policy (Akhtar, 2005).¹² As a result, the SBP is contemplating the adoption of inflation rate as an intermediate target in conduct of its monetary policy.¹³ However, a systematic investigation of the effect of monetary growth on inflation rates in Pakistan must be made before such a policy is adopted. This is because many other factors such as, inflationary expectations, exchange rate, foreign inflation, output growth, etc. also affect domestic inflation. Once the magnitude of the impact of monetary policy on inflation has been obtained, it will also be important to assess the cost of an inflation targeting monetary policy. This is because a contractionary monetary policy can have a negative effect on output growth, at least in the short run, which could spark a recessionary trend in the economy. These two tasks are pursued in the following sections.

IV. An econometric model for determination of price level in Pakistan and the data used for its estimation

In this section, a model of general price level is developed and estimated with a view to analyzing the significance of domestic and foreign economic variables affecting inflation in Pakistan. The model is given below.

$$P_t = f(P_t^m, MS_t, Y_t) \quad (1)$$

$$P_t^m = ER_t * PF_t \quad (2)$$

$$P_t = f(ER_t * PF_t, MS_t, Y_t) \quad (3)$$

This model relates the general price level (P_t), to the domestic price level of imports, domestic money supply (MS_t), and domestic output level (Y_t). The imports price level is the product of the foreign exchange rate (ER_t) measured as Pakistan rupees per US dollar, and foreign price level (PF_t). The subscript t refers to the time period. The log-linear formulation of the model is given below:

$$\ln P_t = d_0 + d_1 \ln (ER_t * PF_t) + d_2 \ln MS_t + d_3 \ln Y_t + u_t \quad (4)$$

¹² The rates of inflation experienced over the past two years were on the higher side of the estimated range of "threshold inflation rates" provided for Pakistan. The threshold rate of inflation is the maximum rate up to which there is a positive relationship between inflation and economic growth. According to Khan and Senhadji (2001) this rate is between 7-11 percent and according to Mubarik (2005) this rate is exactly 9 percent for Pakistan. However, the current rise in inflation remains a concern mainly because higher inflation is reinforced by higher inflationary expectations.

¹³ The present conference is an indication that an inflation targeting monetary policy is being contemplated.

Where we expect $d_1, d_2 > 0$, and $d_3 < 0$.

Pakistan is a small open economy which operates below full employment and relies on imports for meeting the domestic demand for not only intermediate and capital goods but also for certain consumer goods. The annual share of capital goods and raw materials required for capital and consumer goods rose from about 84 percent in 1990-91 to about 91 percent in 2003-04 (Appendix 2). It is generally believed that the imported inflation has been an important factor in Pakistan's inflation record, in particular, since the early 1970's. The changes in domestic prices of imports due to changes in exchange rate and world market prices (foreign prices) can be expected to influence the domestic price level significantly. However, some researchers (for e.g., Hyder and Shah, 2004) have recently argued that the "exchange rate-pass through" effect in Pakistan is insignificant suggesting that exchange rate changes do not significantly affect the general price level. The model given by equation (2) restricts the coefficients of the exchange rate and foreign price variables to be equal in sign and magnitude. Therefore, we have modified the model to include the exchange rate and foreign price level variables separately so that their effects can be evaluated separately. The resulting model is given by the equation (5) below.

$$\ln P_t = a_0 + a_1 \ln ER_t + a_2 \ln PF_t + a_3 \ln MS_t + a_4 \ln Y_t + u_t \quad (5)$$

Where, we expect $a_1, a_2, a_3 > 0$, and $a_4 < 0$.

The preceding model assumes that the price level adjusts instantaneously to its' equilibrium level (P^*_t) in the current period in response to the changes in the explanatory variables (i.e., $P_t = P^*_t$). However, in a typical developing country it is reasonable (for various reasons) to assume that prices do not adjust instantaneously. Under the assumption that prices do not fully adjust in the current period, the following partial adjustment mechanism is introduced into the model.

$$\ln P_t - \ln P_{t-1} = w [\ln P^*_t - \ln P_{t-1}] \quad (6)$$

Where $0 \leq w \leq 1$

Substitution of equation (6) in equation (5) yields the following partial adjustment (or disequilibrium) formulation of the model.

$$\begin{aligned} \ln P_t = & b_0 + b_1 \ln ER_t + b_2 \ln PF_t + b_3 \ln MS_t \\ & + b_4 \ln Y_t + b_5 \ln P_{t-1} + u_t \end{aligned} \quad (7)$$

Where, $b_0 = wa_0$, $b_1 = wa_1$, $b_2 = wa_2$, $b_3 = wa_3$, $b_4 = wa_4$, and $b_5 = 1 - w$.

If b_5 is statistically significant, the long run elasticities would be given as follows:

$$a_1 = b_1 / (1 - b_5), \quad a_2 = b_2 / (1 - b_5), \quad a_3 = b_3 / (1 - b_5), \quad \text{and} \quad a_4 = b_4 / (1 - b_5).$$

The model given by equation (7) was estimated by the method of Ordinary Least Squares (OLS) using quarterly data for the period 1982-2004. Two versions of the model were estimated using consumer price index (CPI) and wholesale price index (WPI) as alternative measures of domestic price level. The exchange rate is measured as Pakistan rupees per US dollar and the US wholesale price index is used as a proxy for foreign price level.¹⁴ Broad money supply (money plus quasi money) measured in nominal terms is used as the domestic money supply variable. The quantum index of manufacturing production is used as a proxy for domestic output level, due to the unavailability of quarterly data on aggregate output. All of the data used for estimation of the model have been obtained from the electronic version of the International Financial Statistics (IFS) that are produced by the International Monetary Fund (IMF).¹⁵ The electronic files provide consistent series on index numbers.

Several events that took place at or very close to the turn of the millennium may have generated structural breaks in the model. These events include the 1990's adoption of monetary sector reforms and greater fiscal consolidation, change of government as well as the change of SBP governor in 1999, unification of foreign exchange rate and the adoption of a greater floating (flexible) exchange rate system in May 1999. The model was modified to accommodate for possible structural instabilities using dummy variable techniques as follows.

$$\begin{aligned} \ln P_t = & c_0 + c_1 \ln ER_t + c_2 \ln PF_t + c_3 \ln M_t + c_4 \ln Y_t + c_5 \ln P_{t-1} \\ & + c_6 D_t + c_7 D^* \ln ER_t + c_8 D^* \ln PF_t + c_9 D^* \ln MS_t + c_{10} \ln Y_t \\ & + c_{11} D^* \ln P_{t-1} + v_t \end{aligned} \quad (8)$$

where, $D=1$ for the period 1982-1999, and 0 otherwise.

In the process of estimating equation (8), only the statistically significant dummy variables were retained in the estimated equations. The estimated results from those final equations, after correcting for first order serial correlation by the Cochran-Orcutt method, are reported in table 1 for CPI and table 2 for WPI.

¹⁴ According to Government of Pakistan (2005), about half of Pakistani imports originate from the USA, Japan, Kuwait, Saudi Arabia, Germany, the UK and Malaysia.

¹⁵ Saint Mary's University subscribes to the electronic database of the IFS.

TABLE 1: RESULTS OF THE MODEL ESTIMATED FOR CPI, 1982-2004 (CORRECTED FOR AUTO-CORRELATION)				
Variable	Coefficient	Standard Error	T-ratio	Adjusted R-square
LnER _t	0.00419	0.02117	0.198	0.99
LnPF _t	0.25639	0.04450	5.762	
LnMS _t	0.07856	0.01607	4.889	
LnY _t	-0.03497	0.00672	-5.203	
LnP _{t-1}	0.83863	0.03443	24.36	
D	0.94027	0.3482	2.700	
D*LnPF _t	-0.20845	0.07529	-2.769	
Constant	-1.3815	0.2021	-6.837	

TABLE 2: RESULTS OF THE MODEL ESTIMATED FOR WPI, 1982-2004 (CORRECTED FOR AUTO-CORRELATION)				
Variable	Coefficient	Standard Error	T-ratio	Adjusted R-square
LnER _t	0.01766	0.03054	0.578	0.99
LnPF _t	0.24893	0.06893	3.612	
LnMS _t	0.06645	0.02537	2.619	
LnY _t	-0.02799	0.01094	-2.560	
LnP _{t-1}	0.85385	0.04965	17.20	
D* LnMS _t	0.19666	0.06834	2.878	
D* LnP _{t-1}	-0.61012	0.2101	-2.903	
Constant	-1.3277	0.2984	-4.449	

V. Discussion of results of the price model

The results reported in tables 1 and 2 indicate that the estimated elasticities with respect to all of the variables except the exchange rate (ER) are significant at 5% level of significance in both CPI and WPI versions of the model. All the coefficients have expected signs. The structural instability of the post 1999 period is characterized by an increase in the intercept and a decrease in the coefficient of the foreign price level (PF) in the CPI version of the model. This resulted in a decrease in both the short-run and long run-elasticities of CPI with respect to PF, leaving all of the other CPI elasticities unaffected (Table 3). Hence, the effect of import prices on the CPI inflation has fallen in the post 1999 period, which is identified by a new government, new SBP governor, and greater liberalization of foreign exchange rates,. However, in the case of WPI model, the post 1999 period is characterized by an increase in the estimated coefficient of money supply in addition to a decrease in the coefficient of the lagged price level. The decrease in the coefficient of the lagged price level indicates a substantial increase in the coefficient of partial adjustment (w) in the model from 0.14615 to 0.75627. This increase in the speed of adjustments may have been a direct result of the policies of economic liberalization and deregulation. The structural break also resulted in an increase in the short run elasticity of WPI with respect to money supply. However, all of the long-run elasticities of WPI, including money supply elasticity, decreased after 1999 as a consequence of the increased coefficient of partial adjustment. The estimated short-run and long-run elasticities are all less than unity for the most recent period 2000-2004, indicating that Pakistan's general price level is inelastic with respect to

all of the variables in the model. However, as expected, the long-run elasticities are greater than their respective short-run elasticities in magnitude.

Table 3: ESTIMATED SHORT-RUN AND LONG-RUN ELASTICITIES BASED ON PRICE MODEL					
	Variable	Short run 1982-99	Short run 2000-04	Long run 1982-99	Long run 2000-04
CPI elasticities					
	Exchange rate	0.00419	0.00419	0.02597	0.02597
	Foreign prices	0.25639	0.04794	1.58883	0.29708
	Money supply	0.07856	0.07856	0.48683	0.48683
	Output	-0.035	-0.035	-0.21671	-0.21671
WPI elasticities					
	Exchange rate	0.01766	0.01766	0.12083	0.02335
	Foreign prices	0.24893	0.24893	1.70325	0.32915
	Money supply	0.06645	0.26311	0.45467	0.3479
	Output	-0.028	-0.028	-0.19152	-0.03701

For the sub-period 1982-1999, the estimated elasticity with respect to foreign price level has been the largest of all in the short-run and long-run, in both the CPI and WPI models. This clearly indicates a greater degree of sensitivity of domestic prices to foreign prices during the pre-2000 period. The effect of foreign prices on domestic prices appears to have diminished since 2000. However, the elasticity with respect to money supply turned out to be the largest of all among the short-run and long-run elasticities for the sub-period 2000-2004, in both the CPI and WPI models. This indicates that in the post-1999 period, monetary policy has had a greater influence on domestic prices than previously and now dominates over the effect of all other variables. The elasticities with respect to ER and PF are significantly different and show that the domestic price level is more sensitive to changes in PF than in ER. The fact that estimated elasticity with respect to ER is statistically insignificant and nearly zero supports the view that the exchange rate pass-through is not strong in the case of Pakistan.

We now discuss the feasibility of an inflation targeting monetary policy in Pakistan, in the light of our results of the price model.

VI. Feasibility of an inflation targeting monetary policy in Pakistan

A monetary policy that targets the inflation rate manipulates the monetary tools to influence the money supply at a level expected to be consistent with the announced inflation rate target.¹⁶ There are five major components of this policy: 1) statement of the objective of price stability that also becomes the criterion for assessing central banks' performance, 2) declaring the numerical target range for inflation through consultations between monetary authorities and the government, 3) independence of central bank, 4) greater transparency of monetary policy and greater accountability of central bank, and 5) freely floating exchange rate. Many countries have already adopted such a policy and many are contemplating its adoption.

The results of our price model showed that the effect of monetary policy on domestic price level has increased in the post 1999 period as indicated by the increase in the estimated coefficient of the money supply variable. Given this result and the successful implementation of inflation targets in several other countries the observed increase in the rate of inflation over the last two years leads monetary authorities in Pakistan to explore seriously the feasibility of adopting inflation targeting to achieve their stated macroeconomic goals of minimizing output fluctuations and of stabilizing prices.

As we have discussed earlier, Pakistan's monetary sector has undergone many market based reforms since early 1990s. Declining budget deficits should result in greater independence of its central bank. Several measures are adopted by the SBP to increase the transparency of its operations in order to enhance private sector confidence.¹⁷

In the new monetary environment of the country, issues regarding the choice of an inflation targeting monetary policy can be discussed. Some of these issues are discussed below in light of the empirical estimates of our price model.

Exchange rate pass-through

A flexible exchange rate system is considered an important component of an inflation targeting regime. The experience of many developing countries including Pakistan has been one of sharply depreciating domestic currencies under flexible exchange rates regimes. Such depreciations can lead to substantial increases in the rate of inflation undermining the credibility of the inflation targeting regime in a country where the exchange rate pass-through is very strong. The results of the present study show that the exchange rate elasticity of the domestic price level is nearly zero suggesting that the exchange rate pass-through is not strong in Pakistan. Therefore, one could argue on the basis of these results that the depreciation of Pakistan rupee may not pose a serious difficulty for an inflation targeting regime.

¹⁶ In some countries, such as Canada, the monetary policy uses the "core" inflation rate as the intermediate target. However, in most countries that have adopted the inflation rate targeting regime, the "Headline inflation" or simply the CPI inflation, is used.

¹⁷ The monetary reforms and measures taken by the SBP for transparency of its operations were discussed while reviewing the monetary policy record of Pakistan.

Imported inflation:

Inflation resulting from increases in foreign prices of imports (imported inflation) has been a salient feature of inflation experience in many developing countries, particularly under trade liberalizations, in the recent past. Imported inflation can pose serious difficulties in forecasting and achieving inflation targets in countries which depend heavily on imports. The import to GDP ratio in Pakistan is about 15 percent. The present study has shown that import prices have a statistically significant impact on domestic prices. This should be of concern for the authorities if Pakistan were to adopt inflation targeting even though the foreign price elasticity of general price level is less than unity. As shown in Appendix Table 2, most of the imports in Pakistan comprise of capital goods and raw materials needed for the production of consumer goods.¹⁸ The demands for these imports tend to be inelastic with respect to their prices. This implies that the country may not be able to turn the balance of trade and terms of trade in its favor if it were to switch completely to a floating exchange rate regime, as required under an inflation target regime. Stability of exchange rate partially offsets such effect.

Effectiveness of monetary policy

The results of this study show that money supply is one of the statistically significant variables affecting the general price level and therefore, monetary policy can affect domestic inflation. In fact, the elasticities with respect to money supply are the highest of all the estimated elasticities. However, both CPI and WPI are inelastic with respect to money supply both in the short-run and in the long-run, indicating a low sensitivity of price level to monetary policy (albeit higher in the 2000-04 period). This implies that a small change in inflation rate would require a substantial change in money supply growth rate. In addition, Roger and Stone (2005) have shown that countries which have adopted inflation rate targeting policy tend to miss their targets about 40 percent of the time and often by substantial amounts for prolonged periods.¹⁹ As a consequence, countries have to keep adjusting their monetary growth rate off and on. If the same experience is repeated in Pakistan and the monetary policy has to keep adjusting money supply growth rate, a large fluctuation in money supply and economic growth could occur for a prolonged period. This would lead to economic instability and uncertainty defeating the major purpose of an inflation targeting policy.

Effect of output growth

The interest among authorities in inflation targeting in Pakistan, like in many other developing countries, is partly driven by their interest in bringing down higher rates of inflation in addition to minimizing fluctuations in the rate. The estimates of the present study indicate that the domestic output growth can help reduce inflation further in addition to monetary policy, if the authorities were successful in promoting economic growth while following a restrictive monetary policy. During a period when fiscal policy also runs in the direction of a contractionary

¹⁸ The Table also shows that the share of capital goods and raw materials in total imports has not changed over time.

¹⁹ This outcome is attributed to the flexibility of the framework and its high standards of transparency and accountability.

stance this may be a challenging task. The likelihood that inflation targeting has a negative impact on output growth in the initial stages makes it more difficult. We now turn to a quantification of this likelihood.

Output cost of inflation targeting

One important consideration in the adoption of inflation targeting monetary policy is its cumulative effect on the output gap.²⁰ The empirical evidence show that during the process of adjusting money supply to arrive at the target rate of inflation, output losses are inevitable. The ‘sacrifice ratio’ provides an estimate of this loss of output. This ratio is a measure of the cumulative percentage decline in output below the potential level, resulting from a one percentage decline in inflation that is caused by a contractionary monetary policy. We attempted to estimate the ‘sacrifice ratio’ for Pakistan under a simple set of plausible assumptions and following the study of Kapur and Patra (2004). Details of the econometric model used for estimating the sacrifice ratio, and its results, are provided in Appendix 3. Using the CPI inflation, we estimated the sacrifice ratio to be 0.87 which indicates that one percent decline in inflation rate caused by a permanent reduction in monetary growth would result in a cumulative output (GDP) decline of 0.87 percent below its potential level.²¹ Inflation in Pakistan was about 7.4 percent in 2003-04 and 9.3 percent in 2004-05. For the three year period 2000-03, the average annual inflation rate in Pakistan was about 3.4 percent. Hence, if monetary policy were to target the inflation rate of 3.4 percent, the resulting cumulative decline in output below its potential level (trend) would be about 5.1 percent. A simple trend line of GDP growth fitted using the data since 1982 shows that the actual GDP was above its predicted (trend) level by about 6.6 percent in 2005. This implies that if a monetary policy were to target a rate of inflation equal to that of the 2000-03 , a negative output growth could be inevitable.

Lags in adjustments

The large and statistically significant magnitude of the lagged price elasticity in both CPI and WPI versions of our model highlights the importance of taking lag adjustments into account in forecasting future inflation rate for the purpose of setting realistic targets and achieving them. The lags in adjustments may be due to various factors including market imperfections which have to be fully investigated and understood before an inflation targeting policy is launched. (Many researchers have included lagged price level as a measure of expectations in the models of price level. If one views the model estimated in this model as an equilibrium model of price level incorporating expectations, the coefficient of lagged price variable can be interpreted as indicating the important role of expectations on price level and inflation in Pakistan. Inflationary

²⁰ An output gap is defined as the difference between the actual and potential outputs (say GDP), both measured in real terms. In empirical literature, potential output in developing countries is measured as the trend output obtained as the predicted value of output from an equation that regresses real GDP on the time trend. For an example, please see Kapur and Patra (2004).

²¹ It is important to note that estimations of sacrifice ratio focus on reducing inflation on a permanent basis as a deliberate strategy by monetary policy. Temporary reductions in inflation that generate due to other reasons, such as a favorable supply shock, are not incorporated. For India, Kapur and Patra (2004) used several modifications of the output-inflation trade-off model which we used for our study (described in Appendix 3) and provided a range of sacrifice ratios varying from 0.7 to 2.1.

expectations are affected by economic instability and uncertainty. A credible central bank is also necessary for formation of price expectations in the desired direction.)

Conclusions and directions for future research

In an attempt to assess the feasibility of adopting inflation targeting monetary policy this study investigated the important determinants of the general price level in Pakistan. In particular, this study focused on the effectiveness of monetary policy in influencing the domestic price level by analyzing data for the period 1982-2004. An econometric model of general prices level incorporating money supply, import prices, foreign exchange rate, and domestic output was developed for this purpose. Two versions of the model were estimated using CPI and WPI data as the measures of general price level and broad implications of the results for an inflation targeting monetary policy were discussed. The paper also provides a broad overview of the country's macroeconomic policy record within the context of its political environment and the monetary sector reforms that have taken place since the 1990s.

Our review of Pakistan's macroeconomic policy and performance record shows that stable political governance as well as market based structural reforms were necessary to achieve faster and stable economic growth in the recent past. With the decline in fiscal deficit, Pakistan's fiscal policy has become less and less expansionary. As a result, the country's reliance on private sector and on monetary policy for future economic growth will continue to increase. The declining fiscal deficit also means greater freedom for SBP in the conduct of monetary policy.

Our econometric results indicate that foreign exchange rate variable does not have a statistically significant impact on domestic price level although the import price variable does. This result on exchange rate is consistent with other studies which showed that the exchange rate pass through to domestic inflation in Pakistan is insignificant. However, this result does not necessarily suggest that the likely depreciation of domestic currency under a completely flexible exchange rate regime associated with a future inflation targeting monetary policy would not affect inflation. Given that Pakistan has never had a completely free floating exchange rate regime or markets completely free of government intervention the reasons behind lack of exchange rate-pass through to domestic prices must be fully investigated before making such a conclusion. It may well be the case that domestic price controls and contract prices of imports have prevented the exchange rate pass-through to domestic prices.

Monetary policy has a statistically significant effect on domestic price level and this effect has increased in the post 1999 period. However, the price level remains inelastic with respect to money supply. Other variables such as, import prices, and domestic production also play an important role in determining domestic price levels. This result implies that large changes in money supply growth may be required to achieve a target level of inflation. Experience of other countries which have adopted inflation targeting monetary policy suggests that they tend to miss their targets 40 percent of the time and hence have to adjust their money supply growth to achieve the target level of inflation. Given the low money supply elasticity of price level, this could mean large fluctuations in money supply which could in turn result in large fluctuations in the output growth.

Our estimates of the sacrifice ratio indicate that the output cost of reducing CPI inflation back to its 2000-2003 level of 3.4 percent could result in a cumulative output loss of about 5.1 percent of potential output. A future research should provide a more detailed estimate of the sacrifice ratio by incorporating the aggregate supply and demand shocks as well as expectations formation. A comparison of the output cost with the benefits of controlling inflation should also be made. We intend to pursue this research for a later paper.

Due to data limitations, we were only able to obtain our results for CPI and WPI inflation rates. It will also be interesting to also analyze the impact of monetary policy on “core” inflation rate in the country.

Among the findings of the present study the lack of exchange rate pass through stands in favour of inflation targeting. However, the other findings including the significance of imported inflation, relatively low impact of monetary policy on inflation, importance in lag adjustments in price level, and the strong likelihood of considerable loss of output and negative economic growth at the initial phase raise concerns about the feasibility and effectiveness of inflation targeting.

Appendix 1: Growth Performance of Selected Sectors, Pakistan (1970-2005)

Year	GDP	Agriculture	Manufacturing	Large-Scale Manufacturing	National Saving Rate	Investment Rate
1970s	4.8	2.4	5.5	4.8	11.7	17.4
1980s	6.1	4.1	8.2	8.2	13.8	17.5
1980-81	6.4	3.7	10.6	11.5	14	17.4
1981-82	7.6	4.7	13.8	15.7	13.2	17.9
1982-83	6.8	4.4	7	6.6	15.3	17
1983-84	4	-4.8	7.9	7.7	13.8	16.7
1984-85	8.7	10.9	8.1	8	12	17
1985-86	6.4	6	7.6	7.3	13.8	17.4
1986-87	5.8	3.3	7.5	7.2	16	18
1987-88	6.4	2.7	10	10.6	13.1	17.3
1988-89	4.8	6.9	4	2.4	13.6	18.3
1989-90	4.6	3	5.7	4.7	13.6	18.2
1990-91	5.6	5	6.3	5.4	13.9	18.5
1991-92	7.7	9.5	8.1	7.9	16.9	19.9
1992-93	2.3	-5.3	5.3	4.1	13.5	20.5
1993-94	4.5	5.2	5.5	4.3	15.6	19.4
1994-95	5.2	6.6	3.6	1.5	14.2	18.3
1995-96	4.6	5.3	4.4	2.6	11.6	18.7
1996-97	3.1	0.7	1.8	-1.4	11.3	17.7
1997-98	4.3	4.4	7.9	7.6	14.3	17.3
1998-99	4.2	1.9	4.7	2.7	11.7	15.6
1999-00	3.9	6.1	1.5		15.8	17.4
2000-01	1.8	-2.2	9.3		16.5	17.2
2001-02	3.1	0.1	4.5	3.5	18.6	16.8
2002-03	5.1	4.1	6.9	7.2	20.8	16.9
2003-04	6.4	2.2	14.1	18.2	18.7	17.3
2004-05	8.4	7.6	12.5	15.4	15.6	16.8

Source: Various issues of Pakistan Economic Survey (1970 to 1997 copied from Iqbal, 1997).

Appendix 2: Composition of imports, Pakistan (percentage share)

Year	Capital goods	Raw material for		Consumer goods	Total
		Capital goods	Consumer goods		
1990-91	33	7	44	16	100
1992-93	42	6	38	14	100
1994-95	35	5	46	14	100
1996-97	37	5	43	15	100
1998-99	31	6	47	16	100
1999-00	26	6	54	14	100
2000-01	25	6	55	14	100
2001-02	28	6	55	14	100
2002-03	31	6	53	10	100
2003-04	35	7	49	9	100

Source: Pakistan Economic Survey 2004-05.

Appendix 3: Methodology for estimation of sacrifice ratio

Inflation can be reduced through many sources in the economy. These sources include favorable aggregate supply shocks such as a reduction in prices of imports, unfavorable aggregate demand shocks such as a decline in the income of foreign residents, increase in economic growth, and deliberate macroeconomic policy actions directed at reducing aggregate demand.

When a tight monetary policy is used to curtail aggregate demand, there is a short-run adjustment period during which economic output diminishes and prices decline. Expectations of lower prices can further reduce aggregate demand thereby causing the output to move further away from its long-run (potential) level. Automatic aggregate supply increases caused by expectations of lower inflation tend to return the output towards its potential level. The loss in output during the adjustment period becomes a cost of the policy of disinflation. The sacrifice ratio measures the cumulative loss of output as a percentage of potential output when inflation is reduced by one percent.

The output-inflation tradeoff can be analyzed quantitatively using the expectations augmented Phillips curve given by the following equation:

$$\Pi_t = \Pi^e + a(Y_t - Y_t^*) \quad (A1)$$

Where Π_t , Π^e , Y_t , and Y_t^* denote current inflation, expected inflation, current actual output and current potential output, respectively. The sacrifice ratio is given by $1/a$.

The above is a simple expectations augmented Phillips curve. Researchers have estimated several modified versions of the above model. For example, Gordon (1997) suggested the inclusion of the effects of aggregate demand and aggregate supply shocks. Hutchinson and Walsh (1998) included the growth rate of nominal output. This allowed them to measure the proportion of the change in nominal aggregate demand that affect inflation in the short-run, given expected inflation, the state of business cycle and supply shocks. Anderson and Wascher (1999) approached the issue of nominal rigidity by considering lagged inflation and lagged output gap. Kapur and Patra (2004) have calculated different values of the sacrifice ratios for India based on different versions of the above equation. Their estimates of the sacrifice ratio vary between 0.7 and 2.1.

In the present study, we have used OLS method to estimate the above equation only, to calculate sacrifice ratio for Pakistan. The equation is estimated for both CPI and WPI inflation using annual data from the IFS. GDP is used as a measure of output. Data on output gap ($(Y_t - Y_t^*)$) for the period 1982-2004 are obtained as residuals from a regression of GDP on time trend. The results of the OLS estimates are provided in Appendix Tables 3.1 (for CPI inflation) and 3.2 (for WPI inflation). Using those estimates the sacrifice ratios for Pakistan have been calculated as 0.87 with CPI inflation and 0.97 with WPI inflation.

Appendix Table 3.1: Regression Results of the Output-inflation tradeoff (using CPI inflation: 1982-2004)

Variable	Coefficient	Standard error	T-value	Adj. R-square
$Y_t - Y_t^*$	1.146	0.321	3.564	0.347
Constant (π^e)	7.292	0.528	13.820	

Sacrifice ratio = $1/(1.146) = 0.87$

Appendix Table 3.2: Regression Results of the Output-inflation tradeoff (using WPI inflation: 1982-2004)

Variable	Coefficient	Standard error	T-value	Adj. R-square
$Y_t - Y_t^*$	1.034	0.466	2.216	0.151
Constant (π^e)	8.151	0.765	10.649	

Sacrifice ratio = $1/(1.034) = 0.97$

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