Monetary Variability, Output and Inflation in Pakistan: A Simple Statistical Approach

Asmat Ullah[*], Bashir Ahmad Khilji[**] & Syed Waqar Hussain[***]

Abstract

Inflation is one of the main issue faced by less developed countries. In addition to the distortion of income distribution, inflation adversely affect poverty level and expectations of business enterprises. Like all Central monetary authorities in less developed countries, State Bank of Pakistan (SBP) formulates monetary policy to control inflation in Pakistan. A lot of studies have been employed to examine direct contemporaneous effects of money supply growth on inflation rate in Pakistan, however the effects of variability in money supply has so far not been examined well. This study is an attempt to examine the impact of monetary variability on inflation rate in Pakistan. We have estimated monetary variability for M2 using simple moving variance of the time series for its being the most resorted to practice in applied statistics. Simple graphical techniques are used to examine response of inflation rate (and growth of GDP) to monetary variability over 1950-2010. Simple statistical techniques (i.e. graphs for various time spaces) reveal that monetary variability is directly related to inflation rate in Pakistan. In light of the key findings of the study, it is suggested that SBP need to control monetary variability along with money supply growth to control inflation in Pakistan.

Keywords: Monetary Variability, Output, Inflation, Pakistan

Introduction

Overall Inflation is the persistent or continuous upward trend in the general price level. Inflation is also sometime used to refer to a sustained rise in the prices of some specific set of goods or services, as in "commodities inflation" or "core inflation" as defined by Islamabad policy Research Institute (2008, p.1). Inflation has always remained an important issues for researchers across the world particularly in less developed countries because it has vital implications for economic growth, income distribution and poverty level, Kemal (2006). In addition

[*] Asmat Ullah, M.Phil Scholar, Preston University, Islamabad; Lecturer Govt. Collage Mathra, Peshawar. Email: asmat_ktk@hotmail.com

[**] Dr. Bashir Ahmad Khilji, Professor, Institute of Management Sciences, Hayatabad Peshawar

[***] Dr. Sayed Waqar Hussain, Assistant Professor, Institute of Management Sciences, Peshawar

to economic growth, high inflation also has negative impact on the financial sector development, Quyyum (2006).

The design of monetary policy largely depends on the factors that accelerate inflation. There are basically three schools of thoughts which explain causes of inflationary phenomenon across the world. These are: Monetarists, Structuralists and Fiscalists. The Monetarists held money as dominant factor responsible for inflation both in short run as well as in long run whereas, Structuralists focus on the supply-side factors which drive up the prices of the essential commodities and hence overall inflation in the economy. The Fiscalists' position is based on the massive budget deficits which plays vital role in accelerating growth of inflation. (Khan and Schimmel plinnig, 2006; Malik, 2006)

Inflation is generally measured on the basis of Consumer Price Index (CPI) apart from other measures such as Whole Sale Price index (WPI), Sensitive Price index (SPI) and Food and Non-food inflation etc. Since coverage of CPI is wider than any other measure of inflation and it is a direct representative of cost of living, therefore we proceed with CPI based inflation rate.

Recent estimates of inflation in Pakistan show that year – on – year CPI based inflation was at 12.4% in July, 2011 which dropped to 9.7% in December, 2011, and most recent estimates of April and May, 2012 show that it reached to 11.3% and 12.3% respectively. There are several reasons for this price hike, but most important is the international oil price spikes and supply shocks caused by power outages and recent floods. There has been upward pressure on oil and food prices globally which is also reflected in CPI based inflation rate[1]. However this inflationary trend is not specific to Pakistan only, some of the regional countries also face high inflationary pressure which can be observed in the Table No-1.

Table No-1 shows that with the exception of few months (Dec-2011 and April-2012), both Pakistan and Bangladesh is facing double digit CPI inflation for example CPI inflation rate was 9.7 and 9.9 respectively for both the nations. Whereas India, Sri Lanka and Thailand have been low single digit inflation countries during the same time period. This difference is probably due to food price inflation, which again accounted for double digit inflation for Pakistan and Bangladesh which remained single digit for India, Sri Lanka and Thailand.

[1] The increased in food and commodity prices witnessed in fiscal year 2008-09 pushed CPI to the record level of 25.3% in Aug, 2008-09.

Table No-1: Regional Comparison of CPI and Food Inflation, July 2011 – April 2012

	Pakistan		India		Bangladesh		Sri Lanka		Thailand	
	CPI	Food	CPI	Food	CPI	Food	CPI	Food	CPI	Food
July -11	12.4	17.1	8.4	8.2	11	13.4	7.4	9.3	4.1	7.2
Aug-11	11.6	13.2	9.0	9.6	11.3	12.7	7.0	8.2	4.2	8.4
Sep -11	10.5	9.9	10.1	9.6	12.0	13.8	6.4	6.6	4.1	8.9
Oct-11	11.0	11.7	9.4	10.2	11.6	10.9	5.1	3.8	4.2	9.9
Nov-11	10.2	11.0	9.3	8.5	11.6	12.5	4.7	2.1	4.1	10.2
Dec-11	9.7	9.5	6.5	0.7	10.6	10.4	4.9	2.5	3.6	9.1
Jan– 12	10.1	9.2	5.3	-0.5	11.6	10.9	3.8	-0.2	3.4	7.7
Feb -12	11.0	10.5	8.8	6.1	10.4	8.9	2.7	-4.1	3.4	7.2
March-12	10.8	9.8	9.5	9.9	10.1	8.3	5.5	-2.5	3.4	7.1
April-12	11.3	10.7	----- --	------ -	9.9	8.1	6.1	0.2	2.7	4.9

Source: Economic Survey of Pakistan, 2011-12, p.100

Table No-2 shows the prices of essential commodities from July -11 to April – 12, which reveals that only prices of Masoor Pulse, Moong Pulse and Mash Pulse, sugar and potato have been dropped whereas rest of commodities are showing upward trend in prices. For instance Masoor Pulse, Moong Pulse and Mash Pulse dropped by 6.1%, 12.6% and 8.2% whereas prices of Gram Pulse rose by 36.3%. The highest rise in prices occurred in case of Onion which is 40% and the smallest rise is observed in case of Chicken (Farm) and vegetable Ghee which is 3.5%.

Table No-2: Prices of Essential Commodities (July -11 & April – 12)

Items	Unit	July 2011	Aug 2011	Sep 2011	Oct 2011	Nov 2011	Dec 2011	Jan 2012	Feb 2012	Mar 2012	Apr 2012	%change
Wheat	kg	25.4	25.4	25.9	26.2	26.7	27.3	27.4	27.4	27.5	27.4	7.9
Wheat Flour	kg	29.7	28.6	29.7	29.9	30.2	30.7	30.7	30.8	30.9	31.0	4.4
Rice Basmati	kg	57.2	58.9	58.9	59.1	59.9	59.7	59.1	59.0	60.1	62.1	8.4
Rice Irr-6	kg	43.7	44.7	45.3	45.2	45.2	45	45.4	45.4	46	46.9	7.3
Masoor Pulse	kg	107.5	106	106.1	105.7	104.6	101.2	98.8	98.3	101.6	100.9	-6.1
Moong Pulse	kg	140.3	139.5	137.1	134.0	129.6	124.3	120.9	118.8	122.5	122.6	-12.6
Mash Pulse	kg	145.5	153.3	150.8	148.6	147.3	145.1	143.0	141.4	143.4	141.8	-8.2
Gram Pulse	kg	72.4	72.9	72.7	72.5	71.6	71.4	70.9	75.2	97.3	98.7	36.3
Beef	kg	233.7	239.8	244.6	249.1	252.2	252.2	253.5	257.1	259.6	261.0	11.7
Mutton	Kg	451.1	458.1	463.6	469.9	477.1	479.8	485	491.9	498.6	499.9	10.8
Eggs	Dozen	79	79.8	81.8	82.7	88.5	100.4	116.8	103.5	90.4	72.4	-8.4
Veg.Ghee	2.5kg	495	495	495	495	495	495	495	495	497.6	512.4	3.5
Veg.Ghee(loose)	kg	166.2	166.4	165.9	161.8	160.8	160.4	161.5	161.6	170.3	174.2	4.8
Cooking oil	2.5 liter	495	495	495	495495	495	495	495	495	497.6	512.4	3.5
Potato	kg	31.6	31	31.4	29.4	28.5	21.8	18.6	18.3	18.9	23.5	-25.6
Onion	Kg	18.2	24	32.3	42.7	53.4	36	43.4	37.6	31.8	25.6	40.7
Tomato	Kg	41.8	36.8	47.7	76.5	78.1	61.6	49.4	43.1	33.3	50.3	20.3
Red Chilies	kg	253.4	252.4	283.1	313.8	319.5	318.2	316.4	311.7	307.5	308.4	21.7
Tea pack	200gms	121.1	121.1	131.6	131.6	131.6	131.6	131.6	134.5	140.	142.1	17.3
Chicken Farm	Kg	160.8	164.4	143.5	132.1	127.1	131.9	160.3	162.2	156.9	166.5	3.5

Source: Economic Survey of Pakistan 2011-12, p.108

A number of researchers have investigated the causes of inflation in Pakistan such as Bilquees (1988), Khan and Qasim (1996), Khan and Schimmelpfennig (2006), Qayyum (2006), Kemal (2006) and Malik (2006). These studies concluded that monetary factors play vital role in the long run whereas supply factors cause inflation only in short run [Bilquees(2006), Khan and Qasim (1996), Khan and Schimmelpfennig (2006)]. Qayyum (2006), Kemal (2006) and Malik (2006) accepted monetarists arguments that inflation is only monetary phenomenon both in short as well as in long run.

The impact of growth of money supply on inflation has been investigated by many researchers in different economies including Pakistan, except the question whether monetary variability is inflationary or not? This paper is an attempt to fill the above research gap.

Theoretical Framework

The existing literature on the issue reveals that both classical and monetarists have analyzed the impact of monetary policy on macroeconomy with the variant of quantity theory of money. Classical economist used the simple equation of exchange to analyze the consequences of changes in money supply. This simple equation of exchange is given as follow:

$$M_t V_t = P_t Y_t \tag{1.1}$$

Where, M and V denotes quantity and velocity of money supply respectively. "P" is the price level and "Y" is the real output. Solving equation (1.1) for "P" and then differentiating with respect to time after taking logs, it is reduced to the following form:

$$p_t^g = m_t^g + v_t^g - y_t^g \tag{1.2}$$

Equation (1.2) is the expression in terms of growth of all variables as discussed earlier. The classical explanation of equation (1.2) suggests that an increase in the growth of money supply and velocity of money has one to one contemporaneous proportionate increase on price whereas growth of real output reduces inflation. Re-writing equation (1.2) for output growth, results are reversed, that is, expansion in growth of money supply or its velocity would increase output but growing price level would hamper output growth. The classical economists believe output effect of money supply or velocity of money only as a short run phenomenon whereas price permanently remains high even in the long run, so they reject pro-active monetary policy. The monetarists also agree on some of this discussion about the real and nominal effects of quantity

of money however they follow somewhat different analytical framework[2].

The neo-classical economists such as Lucas (1972, 1973) and Sargent – Wallace (1976) presented a new way of looking at the impacts of monetary policy on macroeconomics known as Lucas – Sargent – Wallace (LSW) model. They held view that based on the assumption of rational economic agents, anticipated rise in aggregate demand (induced by anticipated increase in money supply) doesn't affect output and employment even in the short run whereas unanticipated increase in aggregate demand (cause by monetary surprises) affect output and employment only in the short run. They argue, monetary inducement whether anticipated or unanticipated affect price level both in short run as well as in long run.

The New – Classical position (LSW model) can be explained by the following simple diagram (Figure -1)[3]. Here $Y^s(M_o^e\ldots)$ and $Y^d(M_o^e\ldots)$ represents aggregate supply and aggregate demand corresponding to initial level of money supply. The demand for labor and supply of labor is given by $N^d(P_0)$ and $N^s(M_0^e)$ respectively. With fully anticipated increase in money supply from "M_o" to "M_1" aggregate demand increases to $Y^d(M_1^e)$ from $Y^s(M_o^e\ldots)$ and output increases from "Y_o" to "Y_1" with labor supply curve unchanged (shown in figure 1.a) . The price level increases to "P_1^e" from "P_o" which cause labor demand curve to shift upward to $N^d(P_1^e)$ denoted by dotted line. If labor supply curve is unchanged then level of employment rises to "N_1" from "N_o". Since expected price is unrelated to current policy variables in the Keynesian and monetarist framework, therefore our positions of labor supply and aggregate supply remains unchanged and our analysis is complete.

But in the New – Classical framework, position of labor supply curve and hence aggregate supply curve would change because the expansionary policy change was fully anticipated. So anticipated money supply will increase expected level of money supply and hence expected level of prices, therefore labor supplier will decrease supply of their working hours and hence supply curves will shift to the left to $N^s(M_1^e\ldots)$. This fall in labor supply curve will shift aggregate supply curve to $Y^s(M_1^e\ldots.)$ which will further push upward pressure on price level. This fall in aggregate supply will raise price level to "P_1" as a result demand for labor shift to $N^d(P_1)$. These changes result in a permanent

[2] Keynes also believes that quantity of money is one of the major determinants of aggregate demand which pushes back economy to its full employment if it is enhanced. Its long run effects are neutral under some conditions.

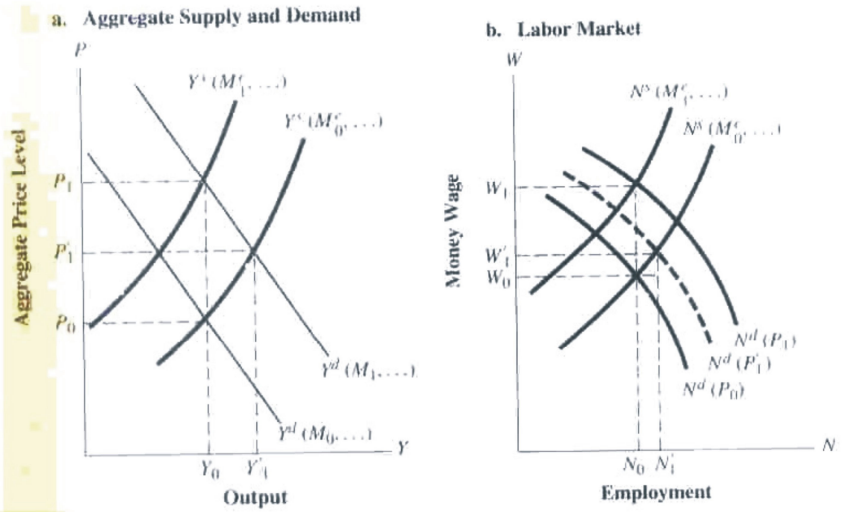
[3] This section is entirely based on Froyen (1996).

increase in price level and money wages whereas output and employment restores to its initial level of "Y_o" and "N_o".

Overall conclusion is the "active policy irrelevant proposition" that is, in the New- Classical framework, there is no space for optimal monetary policy i.e. systematic monetary policy is irrelevant to explain variations in real magnitudes even in the short run. They, however believe that unsystematic or surprise changes in policy variables do have short run real effects. Since in the long run these surprises become anticipated by rational economic agents, therefore such effects are short lived.

The emergence of New – Classical position motivated empirical research in this area. The first pioneering work has been conducted by Barro (1977, 1978, 1979) where he showed that LSW propositions are valid for US economy. Barro examined real effects of anticipated and unanticipated change in money supply whereas its effects were not properly extended to price level determination. This paper is an attempt to properly examine response of inflation to monetary surprises or monetary variability.

Figure – 1: Effects of increase in money supply – The New – Classical Law



Source: Froyen (1996)

Research Methodology

First, we compare growth of money supply (i.e. M2 growth), growth of output (i.e. GDP growth on constant prices of 1999-00) and CPI inflation for Pakistan. For the purpose of simplicity, emphasis has been placed on

decade-wise behavior, however past 59 years sketch has also been presented to clarify that results are the same. Secondly we have estimated monetary and price variability using simple moving variance. It is a good way of measuring variations. These moving variances have been converted into their year – on – year growth rates. The procedure for calculation of variance of a variable for the two time period, t and t – 1 is given:

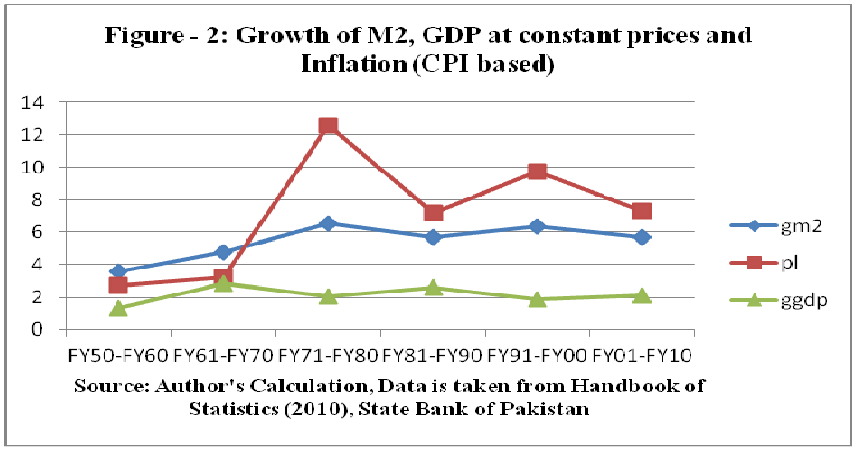
$$y_t = \frac{\sum\left(y_t - \bar{y}\right)2}{n} \qquad (1.18)$$

Where n = 2, and y – bar is the simple mean of "y" for t and t – 1.

The formula (1.1) gives variance of y for t, based on observation from t to t – 1. Similarly, variance of "y" for "t+1" based on data of t+1, t and t – 1 can also be calculated using (1.1). y – bar will be updated to the mean of "y" for t, t – 1 and t – 2, n = 3. Such procedure is followed to compute a series of moving variance of each two variables such as M2 and inflation. Annual data is taken from Handbook of statistics, published by State Bank of Pakistan for the period of 1950 to 2009.

Results and Discussion

Pakistan's monetary policy has been aimed to be pro – growth by influencing future expectations about economic activity and reducing inflation. This historical focus of being anti – inflationary hasn't been properly realized due to lack of sound fiscal - monetary coordination and other structural rigidities, [Economic Survey of Pakistan 2011-12; p.14, p.65 & p.100].

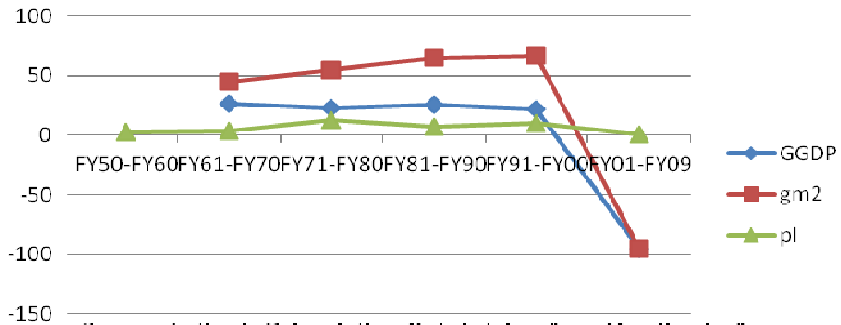


The decade – wise behavior of growth of broad money M2 (gm2), growth of GDP at constant prices of 1999-00 (ggdp) and CPI based inflation rate (pl) is shown by figure -2 above. Figure -2 shows stylized facts about transmission mechanism of Pakistan's monetary policy. When money supply growth has been stable in FY50 – FY60 and mid of FY61 – FY70, inflation and productivity growth was also stable. But with the exception of FY71-FY80 in which Pakistan observed major shocks like partition of Pakistan and several political disturbances, rest of decades showed strong evidence of relationship among money, growth and prices. Simple inspection of Figure No-2 reveals that when growth of money supply (m2) increased from 3.58% in FY50-FY60 to 4.79% in FY61-FY70, inflation rose from 2.73% to 3.23% in the same period. Again, with a drop in growth of money supply (m2) from 6.53% to 5.67% during FY71-FY80 and FY81-FY90 respectively, inflation fell from 12.55% to 7.19% in the same period. This evidence clearly shows that inflation is a long run phenomenon.

Many studies found that inflation in Pakistan is monetary phenomenon in the long run which is also reflected by the perfect movement between inflation (pl) and growth of money supply (gm2) in the figure-2, [Qayyum (2006), Malik (2006) and Kemal (2006)]. This long run relationship among money, economic growth and inflation can also be explained with a figure -3, which shows inflation rates (pl) and decade – on – decade growth of M2 (gm2) and growth of GDP (GGDP) on constant prices of 1999-00. Figure No-3 is constructed on the decade-on-decade moving base year and facts are yet more interesting and impressive. Evidence shows that 12.55% inflation in FY71-FY80 was mainly due to two things: first a massive money growth of 54.58% compared to 44.42% in the previous decade and secondly, a productivity meltdown to 22.93% in FY71-FY80 as compared to 25.88% in the previous decade. This productivity fall was due to many structural issues such as separation of East Pakistan, political crises and social unrest. So we can say that double digit inflation in FY71-FY80 was due to both demand pull factor (monetary expansion) and structural or supply side factors (i.e. fall in output). Figure -3 also clearly shows that recent slowdown in productivity growth and inflation rate has been largely due to fall in nominal money growth.

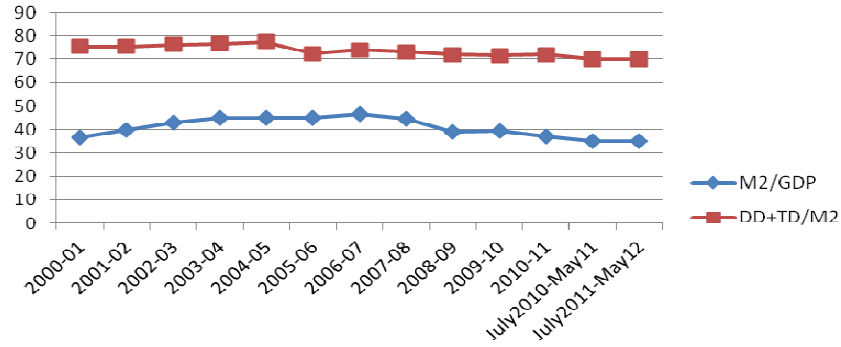
Figure-3 can also be explained with reference to the level of financial development or deepening of Pakistan. Financial deepening or development, being one of the core objectives of monetary authority, promotes economic activities and hence economic growth. Figure - 4 shows the pattern of financial development measured by ration of M2 to GDP and monetary depth of Pakistan economy measured by ratio of demand deposits (DD) plus time deposits (TD) to M2.

Figure-3: Inflation, Decade - on - Decade Growth of M2 and GDP.



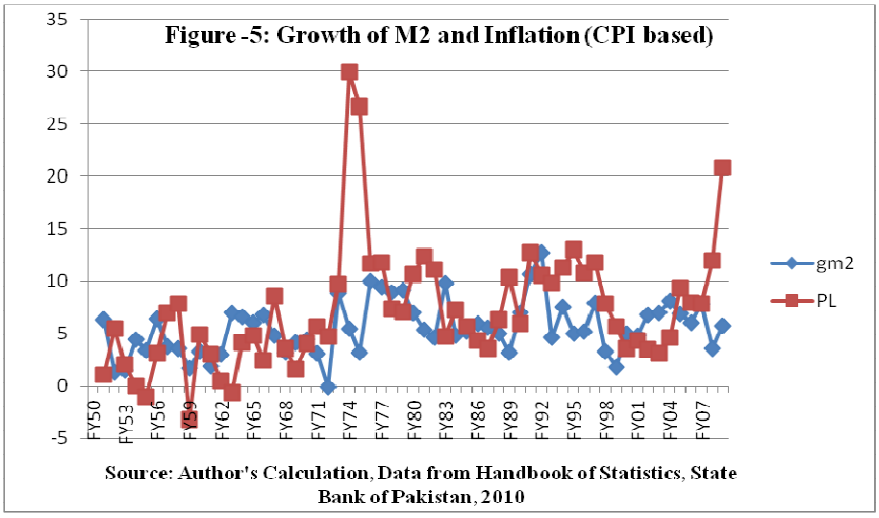
Source: Author's Calcaulation, Data is taken from Handbook of Stattistics (2010) published by SBP

Figure-4: Level of Pakistan's Financial Development and Monetary Depth (2000-01 - 2010-11)



Source: Author's construction from Economic Survey of Pakistan 2011 12, pp.75-76

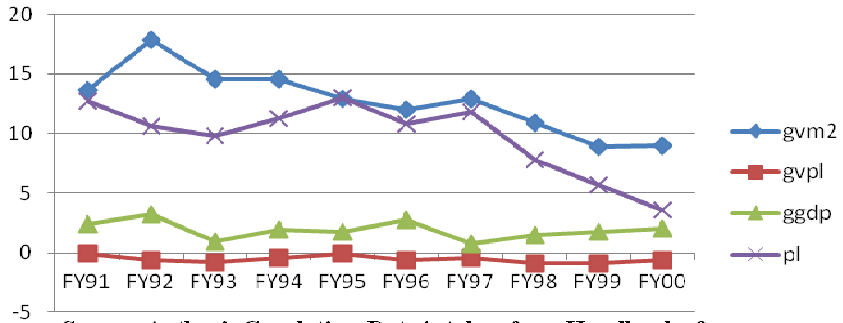
Figure -4 shows that financial deepening (M2/GDP) and monetary depth (DD+TD/M2) have been de-accelerated since FY2007-08 and continuously falling till present. Monetary depth shows a downward trend since FY2004-05, a period of monetary tightening, i.e. registering a decrease from 77.6% to 71.8%. However monetary depth has increased to 70.1% in July 2011-May2012 in comparison to 70% in the same period of last year due to reduction in policy rate to 12% by 200 basis points in the current fiscal year (i.e. 2011-12). This downward fall of financial deepening, monetary depth and growth of money supply (gm2) together can provide better explanation for contraction in output in Pakistan.



The key thing in figure – 3 is the slightly slow response of inflation to falling money growth (gm2). This can give rise to many questions such as: does inflation is long run monetary phenomenon? Does money supply change transmit to price change slowly in the short run? Or what really determine price level in the short run? Figure – 5 provide a simple answer to these questions. Figure – 5 shows growth of money supply i.e. M2 (gm2) and CPI based inflation (pl) from FY50 to FY09. With the exception of FY71 to FY75, money growth and price level have been highly correlated; therefore it is, at least, reasonable to say that inflation is monetary phenomenon even in short run.

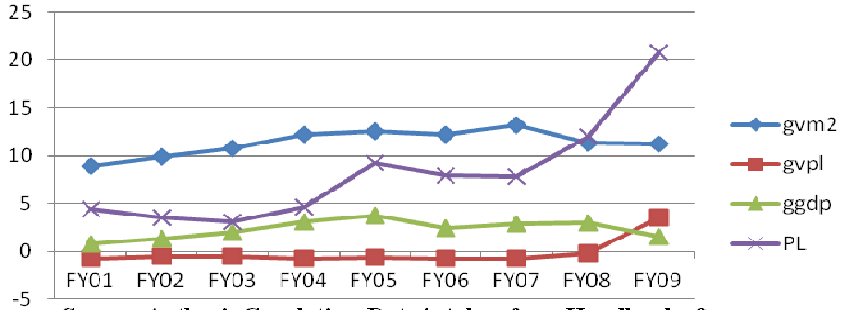
Figure No -6 and 7 are crucial to interpret. Both the figures show price level or inflation (pl), growth of GDP (ggdp), growth of moving variance of M2 (gvm2) and growth of moving variance of price level (gvpl) for various time dimensions. Figure – 6 shows that "GGDP" increased from 2.34% to 3.22% during FY91 and FY92 in response of sharp increase in "gvm2" to 17.82% from 13.61% during same period. In FY93 "GGDP" dropped down to 0.97% in reaction to 14.53% of "gvm2" in the same period. A little increase in "gvm2" to 14.54% in FY94 compared to 14.53% of last year, accelerated "GGDP" 1.92% in FY94 whereas it was only 0.97% last year. Inflation also shows the same behavior in response to "gvm2" whereas "gvpl", which measure the expected inflation or inflation uncertainty, doesn't.

Figure No-6: Price level, Growth of GDP, Growth of variance of m2 and price leve(pl)



Source: Author's Caculation, Data is taken from Handbook of Statistics, State Bank of Pakistan 2010.

Figure No-7: Price level, Growth of GDP, Growth of variance of m2 and price leve(pl)



Source: Author's Caculation, Data is taken from Handbook of Statistics, State Bank of Pakistan 2010

Again Figure No – 7 can also be explained in the same manner. For instance, when "gvm2" increases to 8.93%, 9.88% and 10.81% in FY01, FY02 and FY03 respectively, than growth of GDP "GGDP" accelerates to 0.84%, 1.33% and 2% in the same period respectively. A slight drop in "gvm2" from 11.31% in FY08 to 11.24% in FY09 results a larger cut in growth of GDP to 1.54% in FY09 from 3.01% in FY08. Whereas "gvm2" which in fact measures monetary uncertainty is positively related to the price level (pl) but not to the inflation uncertainty i.e. "gvpl". This is also reflected in our theoretical model.

Conclusions, Recommendations and Extensions

This study is an attempt to examine the impact of monetary variability on CPI inflation and output in Pakistan. Theoretically, neo classical economists argue that output and price level rises due to unexpected monetary injection in the economy. They believe that this unanticipated increase in money supply becomes anticipated to both labors and firms after some time, so labor realize the fall of real wages and reduce their labor supply, which increase money wages in the labor market. Firms demand for labor decreases till original level of employment and output is restored. However, money wages and prices remained high even in the long run. This study partially concludes the same arguments i.e. there are enough statistical evidence to believe that unexpected changes in money supply (i.e. monetary variability) is positively related to output and inflation in Pakistan. But it is difficult to conclude that whether these results are short run or long run. On this the basis of above evidence, it is highly recommended that SBP should not follow unexpected policy announcements since it is highly inflationary in Pakistan.

References

Barro, R. J. (1977). Unanticipated Money Growth and Unemployment in the United States. *The American Economic Review* , Pp. 101-115.

Barro, R. J. (1979). Unanticipated Money Growth and Unemployment in the United States: Reply. *The American Economic Review* , 1004-1009.

Barro, R. J. (1978). Unanticipated Money, Output and the Price Level in the United States. *Journal of Political Economy* , Pp. 549-580.

Bilquees, F. (198). Inflation in Pakistan: Empirical Evidence on Monetarists and Structuralists Hypothesis . *The Pakistan Development Review* , 109-130.

Froyen, R. (1996). *Macroeconomics: Theories and Policies* (6th ed.). New Jersey: Prentice Hall International Inc.

Islamabad Policy Research Institute. (2008). *Inflation.* Islamabad: Islamabad Policy Research Institute.

Kemal, M. A. (2006). Is Inflation in Pakistan a Monetary Phenomenon? . *The Pakistan Development Review* , Pp 213 - 220 .

Khan, A. &. (1996). Inflation in Pakistan Revisited. *The Pakistan Development Review* .

Khan, M. S., & Schimmelpfennig, A. (2006). Inflation in Pakistan: Money or Wheat? *SBP - Research Bulletin* , Pp 213 - 234.

Lucas, R. E. (1972). Expectations and Neutrality of Money. *Journal of Economic Theory* , Pp.103-124.

Lucas, R. (1973). Some International Evidence on Output - Inflation Tradeoffs. *The American Economic Review* , Pp. 326-334.

Malik, W. S. (2006). Money, Output and Inflation: Evidence from Pakistan. *The Pakistan Development Review* , Pp 1277 - 1286.

Qayyum, A. (2006). Money, Inflation and Growth in Pakistan . *The Pakistan Development Review* , Pp 203 - 212.

Sargent, T. J., & Wallace, N. (1976a). Rational Expectations, the Optimal Monetary Instrument and the Optimal Money Supply Rule. *Journal of Political Economy* , Pp 241-254.