ROLE OF MONETARY POLICY IN CURBING PARTIALLY-COST PUSH INFLATION: NOT-SO-EFFECTIVE, YET RELEVANT

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INTRODUCTION

By April 2012, it had been over two years since the RBI announced its exit from the crisis-driven accommodative loose monetary stance. However, inflation continued despite sustained monetary policy action in the form of repeated hike in the interest rates (13 times, up to 100 bps), which indicated an exit from the loose monetary policy stance, to enter into the zone of aggressive, tight monetary policy. Headline inflation, measured by year-on-year changes in the wholesale price index, hit a peak of 10.92% in April 2010-11 and continued to remain within the range of 9-10% throughout the period 2008-2011 with the exception of early 2009. This spell of high inflation has been the longest since the mid-90s and continued up till the last two months, that is, till December 2011.What caused it and what took so long to control it? It is the answers to these main questions that I seek to answer through this paper, which is organized as follows.

I first discuss the plausible causes of inflation in the last 2-3 years. This is followed by an explanation of the logic behind the relevance of monetary policy in case of a supply shock, not because that was the only event that triggered and dragged inflation, but because the tool of monetary policy to curb cost-push inflation, is often questioned. I then briefly describe the basic new Keynesian model, which seems to be the theoretical foundation of monetary policy conduct in India. I do this in order to put the entire preceding discussion into perspective and present a clearer, larger picture. I then present the results of an exercise carried out to empirically corroborate the stated causes of inflation. Lastly, the conclusion.

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PLAUSIBLE CAUSES OF THE RECENT INFLATION EPISODE:

The first thing that comes to mind when one thinks of the recent long spell of inflation is the high prices of essentials of the commodity basket, that is, food and fuel ,which leads (or misleads) one to attribute overall inflation to supply shocks.

The primitive shock to inflation that matured into one of the longest spells of inflation in Indian history came around April 2008 (8%), reached a peak of 12.9% in august 2008, began falling after that and declined to a low of 0.8% by march-end 2009.This rise and fall of wholesale price inflation was more or less synchronized with global commodity price inflation, which rose to sharply in the first half of 2008-09 and greatly subsided by august-September 2008.

Global commodity price inflation was led, in terms of magnitude, by a sharp rise in fuel prices followed by crude oil, food, energy prices, agricultural raw materials and metals. India ranks among the top five importers of oil in the world and its import basket comprises a substantial percentage of oil imports, crude, mineral as well as edible, so it is obvious that a rise in the prices of these commodities must have led to a rise in their domestic prices

But how about domestic food prices? Did they get affected by those at the global level? Only to a very small extent. This is because India can be said to be largely self-sufficient in terms of food. It is the largest milk producer in the world (although the growth of milk yield has been on a decline lately, as I'll show later) and the second largest producer of paddy rice, sugar cane, wheat, cow milk, groundnuts and certain fresh vegetables .Moreover, it has been found that high food inflation was mainly because high inflation of protein-rich items such as milk, eggs, fish and meat. The share of such food has been increasing continuously over the last decade, along with inadequate response of some of these such as milk and pulses

But is it possible for such transient shocks to cause such a long episode of double digit overall wholesale price inflation?

Freedman claimed that a change in the price of a few particular commodities (oil

in the scenario he was referring to), cannot lead to overall inflation because if people are shelling out more to consume the same quantity of commodities as earlier, than surely they must have lesser to spend on others, and hence, prices of these commodities will fall due to reduced demand, which will cancel out the rise in the prices of the others. Hence, no inflation.

But these explanations was based on the assumption that prices are completely flexible, which is not the case in the presence of menu costs, or costs of losing customers. This means that there might be a situation where some relative prices rise more than the others, which, instead of giving a skewness-free distribution of relative prices (as in the Freedmanian world), gives a right-skewed distribution. This situation may arise in the case of large input supply shocks[1]
So the answer to the above question is a yes.

The question that now arises is that were these supply shocks solely responsible for such high prolonged inflation? Afterall, the period till 2008 was that of phenomenal growth for India so much so that the ratio of actual to potential GDP in India exceeded 1 in 2008[2], after having continuously increased from 2005. This was a combined consequence loose monetary policy, rising private final consumption expenditure, increase in wages, not only nominal, but also real of almost all segments of the population, rural, urban, government employees (as a result of the sixth pay commission), rising corporate salaries. Movement of the consumption pattern of a country can be analysed through its deflator generated by the Private Final Consumption Expenditure (PFCE) at current prices over constant prices base 2004-05, which has been rising continuously since that year[3]. Both these facts indicate that there were aggregate demand pressures in the economy, which only aggravated the inflationary situation.

THE ROLE OF MONETARY POLICY

Having established aggregate demand pressures and therefore exhaustion of capacity leading to inflation, we now move on to the question of the role of monetary policy. The role of monetary policy in curbing aggregate demand is quite clear. Raising the interest rate will lead to reduction in aggregate demand via a reduction in investment as well as consumption, which in turn will relieve firms of excess demand and prices will come down. But the scenario was that of supply shocks too. Does monetary policy have a role in dealing with them?The answer is yes in a situation where changes in relative prices are large enough and persistent enough to cause overall inflation[1].Such a situation may arise in the case of a large supply shock of a commodity

[1] Frederic S. Mishkin, "Headline versus Core Inflation in the Conduct of Monetary Policy", October 20, 2007
[2] Laurence Ball and N. Gregory Mankiw,February 1995
[3] Michael Debabrata Patra and Partha Ray IMF Working Paper , "Inflation Expectations and Monetary Policy in India: An Empirical Exploration",March 2010

which is of vital importance to a large number of industries, which holds true for oil, or/and in case of generalized inflation expectations[2].Another possible reason could arise from the fact that increase in prices of essential commodities like food and fuel lead to second-round effects through increases backward-looking inflation expectations. This raises costs of production over and above the cost push, and lead to higher inflation in the next period.

These very inflation expectations in India have been on a rise since 2008[4]. A crucial point is that inflation expectations were running very high even at a time when WPI inflation was near zero. This near-zero inflation is exactly what had led the RBI to be comfortable enough to loosen monetary policy in an effort to 'decouple' India from the global slowdown. And they did this despite awareness regarding the high inflation expectations.

It is in the reining in of these inflation expectations that monetary policy plays a role. But the rein-in is effective only a) if economic agents believe that the RBI is committed to controlling inflation through appropriate policy b) if the RBI is indeed taking appropriate action, the policy will be effective in dealing with the problem of inflation. From the survey, it seems that most agents believe in the latter but not the former.

THE NEW KEYNESIAN THEORY OF INFLATION AND MONETARY POLICY RESPONSE (WITH STICKY PRICES AND BACKWARD LOOKING EXPECTATIONS)

The above analysis narrows down the list of inflation suspects to external oil price shocks, food shock (mainly domestic), excess aggregate demand and inflation expectations. The question that now arises is that if monetary policy does play a role in curbing cost push inflation through its impact on inflation expectations as well as demand –pull inflation through its impact on aggregate demand, why did it take over two years for this role to gets it act together? But before answering that it I will elaborate on the theory behind the mechanism by which these factors cause inflation and the corresponding response and impact of monetary policy on inflation. I will use the New-Keynesian model in order to explain this theory because it is this model that

[4]"Inflation Expectations Survey of Households":March 2011 (Round 23), RBI Monthly Bulletin June 2011

provides the intellectual rationale of monetary policy conduct in India[2]Note that this is just a basic model to give an idea about the theory of inflation and monetary policy. In practice, a lot more variables are used in order to capture country-specific factors. The model is as follows: The aggregate demand/IS curve equation pertaining to this model is as follows:

$$x_t = U\,(i_t - E(\pi_{t+1})) + \mu(Ex_{t+1}) + d_t$$

Here x_t is the output gap, $i_t - E(\pi_{t+1})$ the real rate of interest, Ex_{t+1} is the expectation of future output and dt is the demand shock, t is the time period. If the real rate of return rises, households tend to consume less since its marginal disutility rises. The degree of this rise is directly proportional to the intertemporal elasticity of substitution U. Also, if they expect output to increase in future, which, in turn, raises the possibility of higher future consumption, they increase consumption today since they seek to smooth consumption over their lifetime. We could add extra terms of investment demand and capital, but this only modifies the equation without changing the crux of it, which is, output or aggregate demand in directly related to expectations of future output and inversely related to the real rate of interest. d_t is the demand shock.

The next relationship that comprises the new Keynesian framework is the aggregate supply/ Phillips curve, which specifies current inflation π_t as a function of expectation of future inflation $E(\pi_{t+1})$,the output gap x_t and the supply shock u_t.Note that the output gap is actually a proxy for real marginal costs of the firms and it has been proved to be quite a good proxy.

$$\pi_t = E(\pi_{t+1}) + x_t + u_t$$

The goal of monetary policy is to choose the I which minimizes the loss of welfare to the society,that is, the deviations of inflation and output from their desirable levels given the aggregate demand and aggregate supply as above

[2] Michael Debabrata Patra and Partha Ray IMF Working Paper , "Inflation Expectations and Monetary Policy in India: An Empirical Exploration",March 2010

$$\min \alpha(\pi_t - \pi^*) + \beta(x_t)$$

Basically, policymakers first look at the aggregate supply curve in order to determine the inflation rate and then decide on the optimal interest rate, which, by entering the aggregate demand equation, will bring it down or up to achieve the desired output gap, depending on the direction of the change in interest rate. This desired aggregate demand or output gap, then, affects inflation through the aggregate supply/Phillips curve. . Besides, if the RBI is credible, it can successfully bring down inflation expectations, which will also lead to lower aggregate demand and hence lower inflation. Note that we can use the terms output gap and aggregate demand interchangeably because potential output is generally constant and in fact has been proved to have been so in the Indian case.

UNRAVELLED:

Given the above best-fit for inflation and monetary policy for the Indian case, let us see what must have happened in the recent inflationary scenario. As I have shown above, output gap x_t of India exceeded unity around the first quarter of 2008 with an output gap of around 0.98 since 2005, which isn't too far from the point of capacity exhaustion either. Given the new Keynesian Phillips curve equation, it can be seen that this must have led to inflation. But it is important to note that this wasn't the only factor stimulating inflation. The external oil supply shock u_t of 2008 aggravated the situation by working as a cost push factor to inflation. This is because oil is used as input or for transportation purposes in most industries in India and hence it must have led to right-skewed distribution of relative prices, causing overall inflation[3]. The monetary policy responded by increasing the interest rate in order to rein in aggregate demand or output gap, and hence inflation, which is positively related to the former. But this wasn't the main reason that inflation came down temporarily. It was the ameliorating global commodity prices that eliminated the cost push factor to a large extent and hence brought inflation down. The RBI probably recognized this fact, despite which, it chose to hastily loosen monetary policy, right

[3] Gangadhar Darbha, Urjit R. Patel, "Dynamics of inflation "herding": Decoding India's inflationary process, Global Economy and Development", Brookings Institution, August 2011. They have empirically shown the increased right skewness of this relative price distribution of India over the last decade. The relative price distribution remains right skewed even when the food and energy sectors are excluded, which indicates that inflation pressures had already built in prior to the recent oil and food shocks, possibly due to generally loose monetary policy and excess aggregate demand.

after the disappearance of the shock and again six months later, when inflation had come down to around 1%. The reason behind this was the fears of global recession coming in to India. Policymakers prioritized growth even in the face of inflationary pressures in the form of excess aggregate demand. The irony is that such prioritization eventually led to double-digit inflation, and a tightened monetary policy response, which eventually struck the very thing they had prioritized, that is, growth (which is one of the factors that may have caused the recent downgrade of the Indian economy from 'stable' too 'negative').

2009-10 suffered high food inflation, which continued throughout 2011. In 2010, global prices, especially oil started hardening again. Monetary policy was tightened several times in this phase. What is the justification of monetary policy response to something that is apparently beyond its control, that is, global prices and high food inflation due to supply and demand shocks (which would ideally feature as the u_t in the Phillips curve)? The answer is that it is through the impact on inflation expectations $E(\pi_{t+1})$ that monetary policymakers seek to rein in cost-push inflation. They can accomplish this by abiding by their announcements of raising interest rates as an instrument to rein inflation, which will make them gain credibility, which, in turn will affect inflation expectations. This is something that they practised quite religiously. But what exactly is the role that these 'anchored' inflation expectations will play to rein in cost-push inflation? The answer to this is that these inflation expectations, (which in turn, are highly influenced by food and oil prices) which are the basis of upward wage revisions, higher cost of production and hence inflation. High inflation of essential commodities in terms of their weights in the consumption basket leads to 'second-round effects' of increased inflation expectations, upward revision of wages, higher cost of production of firms, and hence inflation. Besides, if firms themselves expect the rise in input costs to continue (that is, their own inflation expectations will also be high) along with a rise in wage costs, they will increase their mark-up and prices will increase. The question then is, why couldn't these inflation expectations be anchored for so long? The answer is that there are other major factors that determine the formation of inflation expectations, which supersede the interest rate factor. These are- lagged inflation (due to characteristic backward looking expectations in India), which is a sign of inflation persistence (which has been rising continuously starting from the beginning of the last decade[1]) ,food and fuel prices and the economic actors' belief that RBI will not be able to rein in inflation (as it

turns out in the aforementioned survey on inflation expectations)

It is a ramification of these factors that monetary policy is considerably weakened in terms of its impact on inflation. The only strong channel through which monetary policy can affect inflation, is through demand, the scope of the other channel of inflation expectations being limited due to interference from more influential (in terms of influence on inflation expectations) factors such as backward-looking inflation expectations and persistently high inflation, especially that of food and oil and economic actors' pessimism regarding the effectiveness of the RBI's policy stance . This is evident from the fact that it is only after an appreciable fall in aggregate demand or GDP growth in 2011 that inflation got reined in by early 2012.

EMPIRICAL EXAMINATION OF THE RELATIVE CONTRIBTUION OF EXTERNAL OIL SUPPLY SHOCKS, FOOD SHOCKS,AGGREGATE DEMAND SHOCKS AND INFLATION EXPECTATIONS TO WPI INFLATION:

In order to determine the relative importance of external oil supply shocks, domestic food shocks and aggregate demand shocks in affecting overall wholesale price inflation, a VAR model is estimated, in a recursive VAR framework[2]

The model is as follows: The producer/wholesale price inflation is a function of expected inflation of the present period, based on the information set available in the previous period, oil shock, food shock, aggregated demand shock and its own shock.

The equations of the model capture the dynamics of global oil prices, domestic food prices output gap (after taking the contemporaneous effect of the oil and food shocks into account) and wholesale prices respectively. Inflation expectations in each of the equations can be replaced by a linear projection of the appropriate number of lags of all the variables in the model.

$$\pi_t^{oil} = E_{t-1}(\pi_t^{oil}) + \varepsilon_t^{oil}$$

$$\pi_t^{food} = E_{t-1}(\pi_t^{food}) + \varepsilon_t^{oil} + \varepsilon_t^{food4}$$

$$y_t = E_{t-1}(y_t) + \varepsilon_t^{oil} + \varepsilon_t^{food} + \varepsilon_t^{y}$$

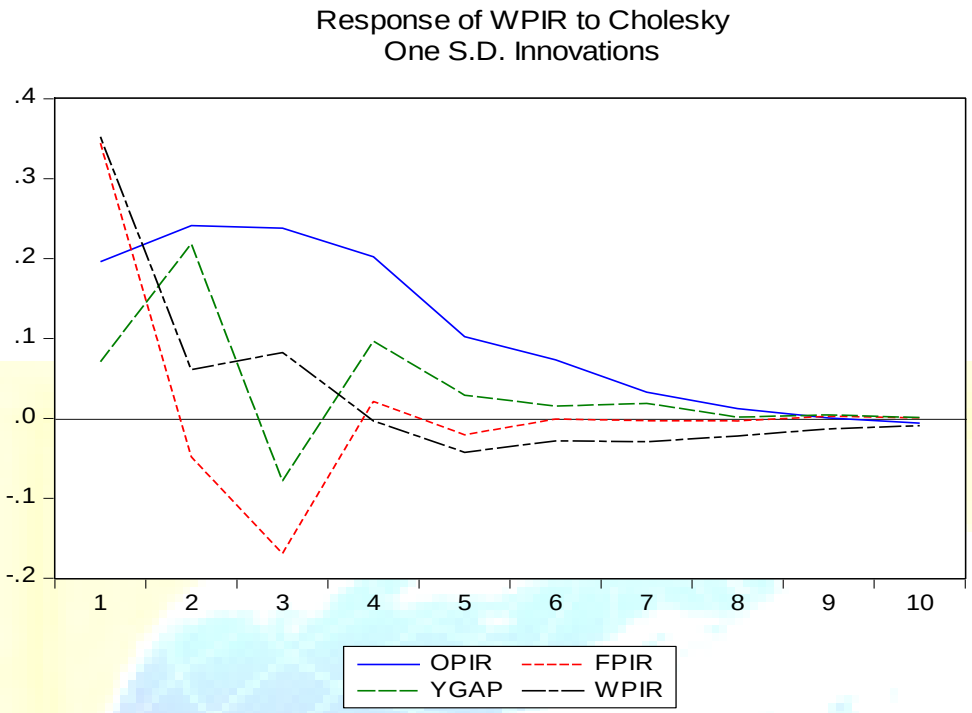
$$\pi_t^{w} = E_{t-1}(\pi_t^{w}) + \varepsilon_t^{oil} + \varepsilon_t^{food} + \varepsilon_t^{y} + \varepsilon_t^{w}$$

The model is estimated by using monthly data from April 2005 till December 2011.The import price of oil has been taken from Indiastat.com from which imported oil inflation has been calculated. The IIP, which has been taken from the RBI Handbook of Statistics, has been used as a proxy for aggregate demand due to lack of data for monthly GDP. The output gap is then obtained using the Hodrick Prescott filter. The monthly all commodities/overall WPI as well as the monthly FPI has been taken from the Office of the Economic advisor, from which, the wholesale price inflation and food inflation has been calculated.

The AIC and the lag length criteria are used to specify the optimal lag length. The model satisfies the block granger causality test, the pairwise correlograms and the normality tests and shows no problem of autocorrelation. The impulse response function of the producer/wholesale price inflation to external oil shock, domestic food shock, demand shock/innovation and own shock to WPI is depicted below. Here OPIR, FPIR,YGAP and WPIR stand for oil inflation, food inflation, output gap and inflation rate (wholesale) respectively.It can be seen from the impulse response function below that each one of the supply shocks, that is global oil price shock as well as domestic food price shock have a long-lasting effect, with the former being much more persistent. The effect of the aggregate demand shock diminishes by the third period, only to reappear soon. Finally, the effect of inflation expectations also have a lasting impact on inflation.

[4] Jeevan Kumar Khundrakpam, "Have Economic Reforms Affected Exchange Rate Pass-Through to Prices in India?", Economic and Political Weekly, Vol. 43, No. 16 (Apr. 19 - 25, 2008), pp. 71-79

[2] Jeff Fuhrer, Yolanda K. Kodrzycki, Jane Sneddon Little and Giovanni P. Olivei "Understanding Inflation and the Implications for Monetary Policy: A Phillips Curve Retrospective", The MIT Press Cambridge, MA London, England ©2009 Massachusetts Institute of Technology,Jonathan McCarthy, Pass-through of Exchange Rates and Import Prices to Domestic Inflation in Some Industrialized Economies, BIS Working Papers No. 79 – November 1999,Rudrani Bhattacharya, Ila Patnaik, Ajay Shah , "Exchange rate pass-through in India",March 26, 2008



IMPUSLE RESPONSE OF WPIR

Period	OPIR	FPIR	YGAP	WPIR
1	0.196049	0.344471	0.070815	0.352360
2	0.241247	-0.048220	0.218371	0.060984
3	0.237846	-0.169111	-0.078156	0.082199
4	0.202347	0.020996	0.096211	-0.003499
5	0.102206	-0.020770	0.028801	-0.042722
6	0.073306	-0.001048	0.015139	-0.028274
7	0.032620	-0.002995	0.018751	-0.029467
8	0.012250	-0.003353	0.001400	-0.022128
9	0.000297	0.002549	0.004142	-0.013466
10	-0.005940	0.000431	0.000599	-0.009315

(CHOLESKY ORDERING OF OPIR, FPIR, YGAP, WPIR)

CONCLUSION:

The seeds of the recent long inflation spell in the Indian economy had been sown with generally loose monetary policy in the late 2000s leading to the output gap exceeding one in 2008. Inflation was aggravated by the global oil shock as well as the domestic food shock, with the second round effects of these shocks leading to further inflation through inflation expectations.

The role of monetary policy in controlling aggregate demand is well-known but there is also a role for monetary policy in ameliorating the effect of supply shocks, more precisely, the second round effects of supply shocks, that is, increased inflation expectations. The channel of controlling inflation by reining in inflation expectations is very weak in case of India as it is interrupted by the factors of lagged inflation and food and fuel prices which are much more significant in the formation of inflation expectations. The channel of controlling aggregate demand is stronger but its transmission to lower inflation comes about slowly. Besides, the continued loose monetary policy despite recognition of the possibility of demand pressures emanating into inflation in early 2009, mainly due to recession fears at the time of the global crisis, worsened the situation. It was a trade-off between inflation and support to growth. Growth was chosen. Inflation took its revenge.

REFERENCES

-Deepak Mohanty, "Decoding the Inflation Dynamics", Speech

-Economic review 2008-09. 2009-10, 2010-11, RBI

-Gangadhar Darbha, Urjit R. Patel, "Dynamics of inflation "herding": Decoding India's inflationary process, Global Economy and Development", Brookings Institution,August 2011

-Governor Frederic S. Mishkin, "Headline versus Core Inflation in the Conduct of Monetary Policy", At the Business Cycles, International Transmission and Macroeconomic Policies Conference, HEC Montreal, Montreal, Canada,October 20, 2007

-"Inflation Expectations Survey of Households":March 2011 (Round 23), RBI Monthly Bulletin June 2011

- Jeevan Kumar Khundrakpam, "Have Economic Reforms Affected Exchange Rate Pass-Through to Prices in India?", Economic and Political Weekly, Vol. 43, No. 16 (Apr. 19 - 25,

2008), pp. 71-79

-Jeff Fuhrer, Yolanda K. Kodrzycki, Jane Sneddon Little and Giovanni P. Olivei "Understanding Inflation and the Implications for Monetary Policy: A Phillips Curve Retrospective", The MIT Press Cambridge, MA London, England ©2009 Massachusetts Institute of Technology

-Jonathan McCarthy, Pass-through of Exchange Rates and Import Prices to Domestic Inflation in Some Industrialized Economies, BIS Working Papers No. 79 – November 1999

-Juthathip Jongwanich and Donghyun Park,ERD Working Paper No. 121, "Inflation in Developing Asia: Demand-Pull or Cost-Push?"

-Laurence Ball and N. Gregory Mankiw, "Relative-Price Changes as Aggregate Supply Shocks" The Quarterly Journal of Economics, February 1995

-Michael Debabrata Patra and Partha Ray IMF Working Paper , "Inflation Expectations and Monetary Policy in India: An Empirical Exploration",March 2010

-Michael Woodford, "Interest and Prices", 2002

-Milton Friedman Nobel Lecture: "Inflation and Unemployment" The Journal of Political Economy, Vol. 85, No. 3 (Jun., 1977), pp. 451-47

-N.Gregory Mankiw, Ricardo Reis, Justin Wolfers, "Disagreement about Inflation Expectations"

-Ramon Moreno and Augustin Villar, "Inflation Expectations, persistence and Monetary Policy", BIS paper No.49

-Richard Clarida, Jordi Galí, and Mark Gertler, "The Science of Monetary Policy:
A New Keynesian Perspective" Journal of Economic Literature ,Vol. XXXVII (December 1999), pp. 1661–1707

-Robert E. Lucas Nobel Lecture "Monetary Neutrality", The Journal of Political Economy, Vol.104, No. 4 (Aug, 1996), pp. 661-682

-Rudrani Bhattacharya, Ila Patnaik, Ajay Shah , "Exchange rate pass-through in India",March 26, 2008-RBI official website

- Subir Gokarn, "Food Inflation:This Time it's Different" Lecture at the Gokhale Institute of Politics and Economics, Pune on December 9, 2011