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Inflation, Monetary Policy and Monetary Aggregates

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Abstract

Taxonomically speaking, the received theories of the macroeconomy may be said to comprise monetarism, structuralism, Marxism, the post-Keynesian view and the New Consensus Macroeconomics (NCM). However, in the last few decades, the mainstream view has been converging on the NCM, representing a grafting of essentially Keynesian ideas on a framework of rational expectations. Associated with this consensus has been a steady de-emphasis on the role of monetary aggregates in the framing of monetary policy. This paper is devoted to an examination of the role of monetary aggregates in each of the macroeconomic theories listed above. In particular, it contests the prevailing mainstream policy viewpoint (heavily influenced by the NCM) that monetary aggregates have no explanatory power for inflation beyond that contained in the output gap. On the contrary, the empirical fact that several monetary shocks originate on the supply side, coupled with the strong possibility of monetary shocks affecting output through relative price changes, make out a strong case for the inclusion of monetary aggregates at least as a Second Pillar of monetary policy (in the manner currently done at the European Central Bank). A monetary policy calibrated without reference to monetary aggregates is like Hamlet without the Prince of Denmark.

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I. Introduction

Inflation and unemployment, and the interrelationship between the two, have been the prime preoccupation of macroeconomists throughout the long history of the subject. However, this focus has strengthened after the Great Depression and the writings of Keynes, Pigou, Friedman and others on the relative efficacy of monetary policy vis-à-vis fiscal policy in achieving a balance between these twin objectives. In many countries, the objective of growth has replaced unemployment in the policymakers' preference function (though, of course, the two are very closely correlated), and "growth with (price) stability" has been the popular expression of such a preference function.

In the two decades prior to the global financial crisis, the bulk of the macroeconomics profession seems to have converged on a theoretical consensus, which is usually termed as the *new neoclassical synthesis* or the *new consensus macroeconomics*. We use the latter term and its abbreviation NCM to denote this synthesis in this paper. The theoretical consensus had its reflection in a convergence of policy viewpoints on two cardinal tenets, viz.

i. Monetary policy should be fully committed to a single objective viz. commodity price stabilisation (inflation targeting or IT for short)
ii. A short-term interest should be the main instrument of monetary policy

In addition, parallel to these two cardinal principles, there were a host of other (often implicit) areas of agreement, of which four deserve special mention, viz.

i. Fiscal policy is largely ineffective in controlling inflation, which should be the exclusive concern of the monetary authority
ii. Asset price stabilisation is full of risks and the monetary authorities should practice a "hands-off" policy in asset markets (Jackson Hole consensus)
iii. Money is endogenous to the system, i.e., it is determined (except for some noise or shocks) in the money market once the interest rate is fixed by the monetary authorities.
iv. Money has no independent impact on the macro-economy apart from its impact through the interest rate.

To put these issues in perspective, it might be a good idea to review the significant determinants of inflation according to the four prominent theories of the macroeconomy viz. monetarism, the NCM, structuralism and the post-Keynesian view, along with their monetary policy implications. In particular, **we examine the role of monetary aggregates in the determination of inflation, which has important implications for monetary policy.**

II. Alternative Theories of Inflation: The Monetarist P* Model

The P* model is a simple variant of the classical quantity theory and uses as a starting point the famous equation

$$MV = PY \quad (1)$$

where P is the aggregate price level, Y is real GDP, V is the velocity of money circulation and M is a measure of money supply.

Let Y* be the potential level of real GDP[1] and V* the equilibrium velocity. Further, M is usually taken as a measure of *broad* money supply (M3 in India). We can now define an equilibrium level of P (say P*) as a function of Y*, V* and M (t).

$$P^*(t) = \frac{M(t)V^*}{Y^*} \quad (2)$$

The money supply M (t) is assumed exogenous to the model (2) and $P^*(t)$ represents a moving equilibrium since it changes as M (t) evolves. M (t) is governed by the money multiplier equation

$$M(t) = kH(t) \quad (3)$$

where k is the money multiplier (assumed constant in the short run), and H is high-power money[2].

H is defined by

$$H = (eFR + NDA) \quad (4)$$

In (4) $FR, e \; and \; NDA$ respectively represent the foreign reserves, the exchange rate (units of domestic currency per one unit of foreign currency), and net domestic assets of the central bank.[3]

Converting equations (1) and (2) into logarithmic form and letting lower case letters denote the logarithms of the corresponding quantities, we get

$$p(t) + y(t) = m(t) + v(t) \quad (1')$$
$$p^* + y^* = m(t) + v^* \quad (2')$$

Taking the difference of (1') and (2'), we get

$$(p(t) - p^*) = (v(t) - v^*) - (y(t) - y^*) \quad (5)$$

It is important to bear in mind that the most natural use of the model is to predict *short-term* inflation[4]. The left-hand side of (5) represents the inflation pressure at any given point of time. If $p(t) > p^*$ i.e. the actual price exceeds the equilibrium level, then prices are expected to fall continuously till the equilibrium price is attained. This will happen from equation (5) if the velocity gap $(v(t) - v^*)$ is positive and/or the output gap $(y(t) - y^*)$ is negative. The opposite process operates when $p(t) < p^*$. This leads to the following model for changes in inflation level $\Delta\pi(t)$ (see Hallman et al. (1991), Nachane and Lakshmi (2002) etc.).

$$\Delta\pi(t) = \alpha_0 + \alpha_1\big(v(t-1) - v^*(t-1)\big) + \alpha_2\big(y(t-1) - y^*(t-1)\big) + \sum_{j=1}^{q} \Delta\pi(t-j) + \epsilon(t) \quad \ldots(6)$$

with $\alpha_1 < 0 \; and \; \alpha_2 > 0$

The above model embeds both the monetarist and the Phillips curve views of inflation. If in (6), $\alpha_1 = 0$, the acceleration in inflation depends only on the output gap $\big(y(t-1) - y^*(t-1)\big)$ and the model can be taken to represent the Phillips curve. In this so-called *output-gap model*. If the actual output $y(t-1)$ is greater than its potential value $y^*(t-1)$, then inflation accelerates, and inflation decelerates if the output gap is negative. On the other hand, if both these parameters are non-zero and $\alpha_1 + \alpha_2 = 0$ then the model (6) reduces to

$\Delta\pi(t) = \alpha_0 + \alpha_1\{v(t-1) - v^*(t-1) - y(t-1) + y^*(t-1)\} + \sum_{j=1}^{q} \Delta\pi(t-j) + \epsilon(t)$

Or

$$\Delta\pi(t) = \alpha_0 + \alpha_1\{p(t-1) - m(t-1) - v^*(t-1) + y^*(t-1)\} + \sum_{j=1}^{q} \Delta\pi(t-j) + \epsilon(t) \quad \ldots (7)$$

This may be considered as a monetarist model showing that increases in money supply $m(t-1)$ lead to an acceleration of inflation since $\alpha_1 < 0$

If further $\alpha_1 = \alpha_2 = 0$ then the model only carries a purely inertial effect of inflation, while if both these parameters are non-zero, then the model comes closer in spirit to the NCM model (discussed below).

While the model seems overly simple, it can be quite useful as a rough and ready guide for forecasting inflation in the *short run*. It can be used for monetary policy purposes if the LM curve shows a stable *short-run* relationship between the policy interest rate (repo rate in India) and a measure of the money supply.

III. The New Consensus Macroeconomic (NCM) Model

The NCM theory is currently the framework, which possibly commands the widest acceptance among macroeconomists and policymakers. It essentially represents a somewhat eclectic compromise between the new classical school (Lucas (1972), Sargent (1980) etc.) and the neo-Keynesian view (Mankiw (2000), Phelps (1967), Taylor (2004) etc.) -- a compromise based on securing the micro-foundations of Keynesian sticky prices and wages with optimisation under rational expectations. **Even though the NCM is often presented as a single body of thought, it embraces a broad spectrum of views ranging from those with a strong belief in the real business cycle theory and strictly rational expectations at one extreme to those who tend to place greater emphasis on New Keynesian type of market rigidities.** But most of its adherents claim allegiance to three key precepts –the Rational Expectations Hypothesis (REH), the Efficient Markets Hypothesis (EMH)) and a monetary policy rule (a Taylor-type rule).

The essentials of the NCM approach may be visualized from the closed-economy model put forth by Clarida et al (1999, p.1665 and p.1695) and extended to the open economy case by Angeriz and Arestis (2007) 5. We focus on the closed economy version which is described in terms of the following basic three equations system:

$$[y(t) - y^*(t)] = \lambda[y(t-1) - y^*(t-1)] + E_t[y(t+1) - y^*(t+1)] - \gamma r(t) + u_1(t) \quad (8)$$

$$\pi(t) = \beta[E_t(\pi(t+1)] + \alpha[y(t) - y^*(t)] + \eta[\pi(t-1) - \pi^*] + u_2(t) \quad (9)$$

$$i(t) = r(t) + \theta[\pi(t-1) - \pi^*] + \lambda[y(t-1) - y^*(t-1)] + \rho E_t\pi(t+1) + u_3(t) \quad (10)$$

In the above system, y(t) is the real GDP at time t, $y^*(t)$ is potential real GDP at time t, π(t) denotes inflation, i(t) and r(t) the nominal and equilibrium real interest rates, π^* the target inflation rate, $u_i(t), i = 1,2,3$ are stochastic shocks at time t, $and\ E_t(.)$ denotes expectations of a variable formed at time t.

Equation (8) is the aggregate demand equation (IS curve) and postulates that the output gap (actual GDP minus potential GDP) depends on (i) its own past value (ii) its expected future value and (iii) the

real rate of interest. This equation derives from the inter-temporal optimisation of lifetime expected utility subject to a budget constraint (see Blanchard and Fisher (1989)).

Next, we have the vertical Phillips curve (9) with inflation determined by (i) the current output gap and (ii) future *expected* inflation. Equation (10) is a monetary policy rule specifying the *nominal* interest rate as a function of (i) expected inflation (ii) deviation of past inflation from the "inflation target" (iii) past output gap, and (iv) the *equilibrium real rate of interest*. **This is not a behavioural equation.**

While the above reduced-form model does capture several predominant features of the NCM, most practitioners in the NCM tradition would not adopt this model for actual policy purposes, as from their point of view, it lacked credible micro-foundations. They would prefer instead to work with a full-scale DSGE (dynamic stochastic general equilibrium) formulation.

From the viewpoint of the determinants of inflation, equation (9) in the above model is crucial. It brings out the key role played by inflation expectations of the future price level. The output gap and an inertial effect (past inflation memory) are the other influencing factors. **Of course, some analysts think that making inflation depend upon inflation expectations is almost like 'pulling oneself up through one's own bootstraps'.**

IV. Three Heterodox Views of Inflation

There are three important heterodox alternatives to the mainstream monetarist and NCM views of inflation: the Marxists, the structuralists, and the post-Keynesians. According to the Marxist and structuralist views, the source of inflation is a conflict over the distribution of national product between labour and capital.[6]

The Marxist model posits that inflation arises from a rise in exogenous money supply directly affecting aggregate effective demand (see Rowthorn (1977)). In this view, inflation increases the share of profits by eroding the real purchasing power of workers, the latter being unable to exercise sufficient leeway with the capitalist governments to secure full wage indexation. In the Marxist view, the so-called non-accelerating inflation rate of unemployment (NAIRU) is not a full-employment rate (as in Friedman (1968) and Phelps (1967)) but simply reflects the effects of excess labour demand on the bargaining power of workers (see Bowles (1985) and Pollin (1999)).

The structuralist view originated in Latin America with the seminal contributions of Noyola (1956)[7] and Sunkel (1958). It mainly takes its context as a typical LDC faced with a balance of payments constraint and heavily dependent on capital imports and imports of primary commodities like oil, metals and minerals from the rest of the world. The skewed pattern of land ownership is also a typical feature of the economy.

In the structuralist approach, inflation is an endemic feature emanating from a structural distributive conflict between the big landowning class and the mass of urban industrial workers and landless agricultural workers. Terms of trade shocks provide a trigger to the inflation process, which then perpetuates itself due to four factors (i) the unfavourable terms of trade raise the price of imports (ii) food prices rise because of the inelasticity of food supply arising from unequal land holdings (Cardoso (1981))(iii) foreign exchange constraints in the face of essential capital imports force a devaluation of the domestic currency and (iv) finally, in the face of unabated inflation, governments are compelled to initiate indexation and cash-support programs to quell labour unrest, which induces a hysteresis in the inflationary process (see Simonsen (1970), Pazos (1972), Lopes (1986)[8]).

An exact definition of post-Keynesianism may not be readily forthcoming – this being a matter of considerable debate (see e.g. Hamouda and Harcourt (1988), Davidson (2003-04), Kerr (2005) etc.). Gerrard's (1995) assessment of post-Keynesianism as a "diverse and continuing research effort, characterised at times more by its fragmentation and internal division than by any unity of purpose" (quoted in McDaniel (2012), p. 43) seems quite to the point, and taking this cue, we do not go into a detailed discussion of each separate strand of post-Keynesianism, but focus on the common themes shared by the group as a whole, especially as they bear on the phenomenon of inflation.

The post-Keynesian explanation of inflation is centred on the following six principles:

i. Unemployment is determined in the product market, not the labour market and is caused by the deficiency of effective demand
ii. Involuntary unemployment is not the result of labour market imperfections
iii. Herd behaviour of investors is characteristic of a modern capitalist economy
iv. Money is not exogenously fixed by the monetary authorities but is endogenously arising from the demand for credit by investors
v. Fiscal policy can be effective and *Ricardian equivalence* may not be valid
vi. Distributive conflicts between workers, capitalists, and/or rentiers are the critical determinant of inflation (see Kalecki (1943, 1954), Kaldor (1955-56), Robinson (1972))

There are several post-Keynesian models aimed at encapsulating the above features (see e.g. Hein (2014), Palley (1996), Lavoie (2014) etc.). These models share several common features with the structuralist models, but the focus is more on the distributive conflict between capitalists and workers. The agricultural sector is not explicitly considered as in the structuralist model, though this extension would not be challenging to incorporate. Thus, the post-Keynesian model is essentially a one-sector two-class model.

V. Money Supply and Inflation

A. The NCM View: A Model of Inflation without Monetary Aggregates

We have so far discussed the main theoretical approaches to inflation. Let us see precisely the role of money supply and liquidity[9] (as determinants of inflation) in each of these approaches. The post-Keynesians view money as endogenous, merely reacting to developments in the real economy. Then, it ceases to be a causal factor in inflation. Similarly, the Marxists and structuralists, while they do regard money as exogenous, assign the prime causal role to real supply-side factors (such as wages, bargaining power, distributive conflicts, terms of trade shocks etc.), in determining inflation, with money supply simply underwriting the developments on the real side.

As is well-known, the monetarists view money as the primary or even the only cause of inflation. However, in some of the less strict versions, it is conceded that this role (of money supply) may be mainly long-run, and in the short-run, the effects of money supply may be split between real output and inflation.

It is doubtful whether monetarism, structuralism or post-Keynesianism in their pristine form command much allegiance from the bulk of academics, who have now thrown their weight increasingly behind the NCM viewpoint. According to the NCM, the rate of interest is the key instrument for monetary policy. However, its value should be determined by the monetary authorities via some rule of the type (10) above, in which the *nominal* interest rate (usually the repo rate or in some countries the bank

rate) is some function of (i) expected inflation (ii) deviation of past inflation from the "inflation target" (ii) past output gap and the *equilibrium real rate of interest*.

While the NCM does claim adherence of an academic majority, policymakers have to be more circumspect and adopt a more nuanced view, taking into account a variety of theoretical viewpoints. Of course, no central bank to date has adopted a monetary policy rule *in toto*. However, given that the MPCs comprise largely of academics in most countries, the NCM theory supplies the guideposts for monetary policy. Hence the output gap and the deviation of actual inflation from its target value (set by the government or the central bank) figure prominently in MCP deliberations, but other considerations are also raised.

The role of wages which as we have seen figures prominently in the structuralist and post-Keynesian views is often prominent in MPC deliberations, especially in EMEs (see Agénor and Hoffmaister (1997), Mohanty and Klau (2007) etc.). The exchange rate, while not explicitly figuring in the monetary policy rule (10) of the NCM, is an important determinant of inflation in this model (see (9)). Hence actual policy has to keep an active lookout on exchange rate volatility and balance of payments equilibria. Relative prices were earlier regarded as irrelevant for determining the general level of prices and inflation. However, there is increasing recognition of relative price changes in EMEs where such changes usually appear via frequent changes in administrative prices especially of food, oil, electricity, coal, fertilisers etc. Such relative price changes, especially if they are large, can act as major supply shocks and affect both output and prices (see Fischer (1981) and Ball and Mankiw (1995)).

However, money supply per se rarely figures as an explicit concern in MPC meetings (with the notable exception of the European Central Bank), nor does the budget deficit. Both are a direct outcome of an implicit allegiance to the NCM. In the NCM framework, once the nominal interest rate is fixed, the money supply responds passively settling at a level determined by the LM curve (see e,g, Patra and Kapur (2010)). The very fact that the LM curve nowhere figures in the NCM model indicates the secondary role assigned to money supply. As per the prevailing thinking on monetary policy (almost everywhere), policy operations are conducted by setting the interest rate. Around the year 2000, the FRB in the U.S. stopped publishing money-growth targets in their policy announcements. So far as the ECB is concerned Pillar 2 comprises a detailed analysis of monetary and credit developments, and an attempt is made to exploit the long-run link between money and prices but only to serve as a cross-check of the policy implications from the economic analysis of Pillar 1. In India, no explicit targets are set for any measure of money supply or liquidity, but liquidity management is an important adjunct to interest rate policy. Thus, one may say that the role of monetary aggregates is now usually secondary in monetary policy determination.

While technically, a link is established between interest and output, it is still a bit of a black box. Which interest rate is relevant? There was a strong difference between Hawtrey and Keynes, with the former emphasising short term interest rate and the latter the long term. Empirical studies are inconclusive. Leaving aside the issue**,** let us examine the question as to whether there is a role for monetary aggregates in explaining/predicting inflation beyond that accounted for by the interest rate.

The theoretical explanation of why monetary aggregates play an insignificant role in the NCM is provided by Woodford (2007). Solving the NCM model comprising equations (8) to (13) above, he demonstrates how inflation is determined in this model by the inflation target of the central bank coupled with the expected future discrepancies between the natural rate of interest and an intercept adjustment of the central bank's reaction function (a term capturing the shift in the central bank's views regarding the economy's equilibrium real rate of interest) (see Woodford (2006, p.8-10). He, therefore, maintains that the model implies a determinate inflation rate and a determinate path for the price level (once initial prices

are given). But what this shows is that within the NCM model, there is no indeterminacy regarding inflation and the price level. From this, one cannot conclude that monetary aggregates do not matter in reality without reference to empirical data. **It is highly conceivable that a model including monetary aggregates in addition to the NCM equations could describe empirical reality more accurately than a model without these aggregates because the latter model failed to capture some vital aspect of the effects of these aggregates on the IS curve.**

There are several reasons why monetary aggregates could still have some influence on the economy and we briefly discuss these below.

B. The Neutrality of Money

If, as maintained, in the NCM, one can have a perfectly consistent theoretical explanation of inflation without reference to money supply, does this mean that the NCM and Friedman's monetarism are irreconcilable? As shown convincingly by Nelson (2003), the NCM (at least the faction within it that is closer to the real business cycle school) is consistent with the quantity theory of money. This point is affirmed by several other proponents of the NCM view such as Woodford (2007), Taylor (1992), Hubbard (2002) etc. This *neutrality of money* proposition essentially precludes the possibility that money supply shocks will have *real* effects through relative price changes. However, the neutrality of money essentially arises from the assumption made in both theories that the demand and supply of goods and services depend only on the relative prices structure rather than the absolute price level or aggregate demand is independent of the level of money supply.

But attempts at empirical testing of the neutrality proposition such as those of Bils and Klenow (2002), Balke and Wynne (2007), Anzuini et al. (2013), Pasten et al. (2018) show that monetary policy shocks do affect relative prices and thereby aggregate demand.

Several alternative theoretical explanations can be advanced for the perceived non-neutrality of monetary policy shocks. One long-standing explanation is the *nominal misperceptions model* of Lucas (1972), in which firms and consumers cannot distinguish between aggregate and relative price shocks. Hercowitz (1982) demonstrates how, under this assumption, monetary policy shocks could cause a relative price distortion with some prices changing more than others (but all prices moving in the same direction).

The second group of models in this genre are the *sticky prices models* of Dixit-Stiglitz (1977) and Calvo (1983). Both types of price-setting behaviour can lead to *strategic complementarities or real price rigidities.* The Dixit- Stiglitz model of monopolistic competition with consumer preference for product variety can produce *quasi kinked demand curves,* while the Calvo model postulates a staggered price-setting framework. In combination with firm-specific factors of production, such models are capable of generating relative price dispersion and hence output responses to money supply shocks.

Similar relative price dispersion and output response can be found in models of incomplete information (see Sims (2003), Woodford (2001), Mankiw and Reis (2002) etc.) wherein information collection and processing is costly, and hence some firms find it optimal to proceed based on incomplete information. Other sources of real price rigidities suggested in the literature are (i) countercyclical behaviour of the mark-up of firms (see Pindyck et al. (1998), Rotemberg and Woodford (1991), Hall (1991) etc.) (ii) *thick market externalities* under which purchasing inputs and selling products is easier in booms as compared to slumps (see Diamond (1982), Romer (1993), Akerlof and Yellen (1987) etc.) and (iii) credit market imperfections (Stiglitz and Greenwald (2003), Bernanke and Gertler (1989) etc.[10]

The upshot of the above discussion is that a monetary aggregate measure has a legitimate claim as an additional argument in the IS equation (8).

C. The Real Balance Effect

One of the oldest arguments in the relationship between monetary policy and aggregate demand revolves around the *real balance effect* viz. the impact on consumption and aggregate demand due to an increment in real financial wealth occurring with an increase in the monetary base. However, this argument, though theoretically sound, lacks empirical support. Most empirical studies (see Ireland (2001), Woodford (2003, Chapter 2) etc.) deny any quantitative significance to this effect. Friedman (1972) had categorically stated that "I never have believed that the real balance effect is of much empirical significance". As Nelson (2003) emphasises, the important role of monetary aggregates arises not from wealth effects (i.e., real balance effects) but from substitution effects between money and other assets.

D. Monetary Aggregates and Bank Loan Supply

One great advantage claimed for monetary policy being steered by interest rates rather than monetary targets is that in the former framework *money demand shocks* are automatically accommodated. But even within such a framework, monetary aggregates could still claim some relevance (as monetary policy indicators) if *not all monetary shocks are, in fact, demand shocks.* Monetary shocks originating on the supply side can be important in economies (such as India) where the bulk of money supply is constituted of commercial bank liabilities. Bank behaviour with regard to their liabilities can be volatile depending on their capital base, their risk appetite, their desired net interest margins as well as the state of the macroeconomy. An alteration in these parameters can act as a money supply shock, which can affect personal consumption, business investment and more generally shift the IS curve (8) (see Goodhart (2007)). Under a curtailment of loan supply, companies may fail to cover their credit obligations leading to default and aborting investment plans (see Dell'Ariccia et al. (2005)). Additionally, in their panel data study, Nier and Zicchino (2006) indicate the empirical possibility that bank loan supply can be pro-cyclical and thereby aggravate macroeconomic fluctuations.

The underplaying of monetary aggregates in monetary policy (or their total disappearance as in the case of the FRB) means a certain lack of focus on banks' balance sheets. In the presence of the LM curve, the liabilities side of the banks' balance sheets is immediately brought into the picture. From this, it becomes easier for the central bank to draw direct inferences about bank credit and bank capital. The issue becomes critical in countries (e.g., India) where most banks are publicly owned, NPAs are high and the government has to frequently resort to bank recapitalisation (see Friedman (2003)). An extensive literature has indicated a strong link between bank capital levels and bank loan supply (see van den Heuvel (2002), Gambacorta and Mistrulli (2004), Berger et al. (2016), Kick et al. (2020) etc.). **In the final analysis, bank borrowers are influenced both by the availability and cost of credit. The process of money creation is the process of credit creation. This is obvious when the central bank monetises credit to the government.**

E. Monetary Base Expansion and the ZLB

Monetary base expansion can be the only policy instrument left to the monetary authority in exceptional circumstances. During the recent global financial crisis, interest rates approached the zero lower bound in several countries. By December 2008, the federal funds rate in the U.S. had attained the

zero lower bound (ZLB) being in the range of 0 to 0.25%. But the financial crisis was in full swing, with the real sector now contracting and unemployment climbing up. With the scope for further interest rate reductions at an end, unconventional monetary policy measures had to be tried, directly targeting the cost and availability of external finance to banks, households and non-financial companies (see Bernanke (2009), Eggerston & Woodford (2004) etc.). This can be done by influencing real interest rates (see Smaghi (2009)), and one way to do this is by operating on market expectations – the so-called *forward guidance* under which the central bank can resort to a commitment to maintain the policy rate at the ZLB for a sufficiently long period (see Dotsey (2016)). But such forward guidance cannot be credible unless backed by a large portfolio of securities at the central bank. Thus, the central bank needs to expand its balance sheet by purchasing government and private securities from the market – a process commonly dubbed as quantitative easing (QE). **Though money supply may be partly endogenous because the money multiplier depends on borrowers' propensity, the central bank can largely have its own way because of its capacity to create reserve money. 'Quantitative easing' emphasises the role of money supply in the economy. The need for it can arise under various circumstances.**

F. Liquidity Channel of Monetary Policy

In recent years, especially after the initiation of QE in the U.S. and several other countries, there has been considerable discussion about a new channel of monetary policy viz. the liquidity channel (see Joyce and Spaltro (2014), Rodnyansky and Darmouni (2017), Chakraborty et al. (2019) etc.). QE and the resultant changes in reserve money lead to considerable excess reserves with commercial banks, resulting in an increased propensity to grant loans on the part of banks. These loans could either be business loans or loans for housing or other consumer durables. Of course, if credit demand is generally low as in the downturn, most of the reserves will find their way into government securities. But this "liquidity overflow" unleashed by QE has the potentiality to spill over into inflation once the economy is on the recovery path – inflation which may not be easy to control as the central bank may be reluctant to reverse the interest rates cycle in a significant way, especially in an environment where the markets had become accustomed to a low interest regime for a very long time. Besides, as highlighted by the Bank for International Settlements (BIS) in its 83rd Annual Report, the huge growth in bank reserves brought about by QE in the U.S. and other advanced economies was driving overnight-lending rates to near-zero, making it hard for central banks everywhere to resume using conventional monetary policy. This poses the possibility of a "third party risk" to other nations of a permanent dependency on QE. **As emphasised earlier, what is relevant is that the quantity of money or credit plays a distinct role.**

G. Monetary Aggregates as Indicators

The single interest rate based monetary policy currently espoused by most central banks overlooks an important aspect of monetary policy transmission (first outlined by Friedman and Meiselman (1963) and elaborated subsequently by McCallum (2000), Svensson (2001) etc.), viz. that monetary policy operates through a broad range of interest rates and asset prices. The single interest rate target would be justified if all other interest rates and asset prices moved in tandem with the short-term interest rate at least in the short run. But this assumption is not borne out by the evidence in most countries. In practice, money supply changes do affect the interest rate spreads and the spreads between the short-term rate and equity yields. This happens because of imperfect substitutability between short-term government bonds and longer-term bonds as well as equity yields. This means that the so-called *Operation Twist* (initiated by the Fed in September 2011), with the explicit purpose of increasing the average maturity of the banks' treasury

portfolio could achieve some success in lowering long-term interest rates, thereby stimulating business investment and consumer spending and hence affecting aggregate demand. Thus, these kinds of switch operations can have macroeconomic effects, distinct from the effects of changes in the policy rate.

But another important consequence of the role played by a spectrum of interest rates in affecting inflation is that monetary aggregates do have explanatory power for inflation *given the output gap.* This explanatory power is cached in the typical LM curve because the demand for money is assumed to depend only on a short-term interest rate. It is brought out very clearly in monetarist models where the demand for money depends on a spectrum of interest rates (see Friedman and Schwartz (1982, p. 39-40), Laidler (1982, p.113) etc.). [11] For policy purposes, this observation is very relevant. Since monetary aggregates are easier to observe than a wide variety of interest rates that affect aggregate demand, a monetary conditions indicator based on monetary aggregates may be as informative and easier (and quicker) to construct than one based on a spectrum of interest rates. Thus, a model using money as a proxy for the yield structure can enhance the value of money to monetary policy (see Nelson (2003)).

There is also another possible role (as a monetary policy indicator) for monetary aggregates. The announcement of monetary targets could have a significant signalling effect by providing *forward guidance* to financial and commercial markets on the likely future monetary policy stance (see Meyer (2001)). However, *forward guidance* can be a double-edged weapon. By affecting the short-term and long-term market sentiments of foreign investors, which are extremely sensitive to monetary target announcements, it can aggravate capital flows volatility. For EMEs, this can imply increased exchange rate volatility with adverse consequences for their exports.

VI. Conclusion

There are several conclusions following from our detailed analysis.

1. In contrast to the current orthodoxy, which maintains that money has no explanatory power for inflation beyond that contained in the output gap, we find that monetary aggregates can convey important information about future aggregate demand.
2. Even though the NCM model is not in conflict with the monetarist model, the former ignores one vital aspect of the latter, viz. that aggregate demand is affected by a spectrum of yields, and monetary aggregates can be a readily available proxy for these yields.
3. The NCM model supposes that money supply shocks are essentially from the demand side and automatically accommodated. This ignores the fact that shocks to money can also occur from the supply side owing to the actions of commercial banks that impact their loan supply.
4. Monetary base control can be the only instrument available to a central bank in the eventuality of short-term rates approaching the ZLB.
5. Money supply shocks can affect aggregate demand through relative price distortions.
6. Monetary aggregates can serve as an additional communication tool for central banks via *forward guidance.*
7. Availability matters as much as cost, as far as credit is concerned.

In the final analysis, monetary policy without money is like Hamlet without the Prince of Denmark.

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Notes

[1] There are a number of methods for the calculation of potential GDP Y* such as the *phase-average trend method, Henderson moving average, Hodrick-Prescott filter, Baxter-King filter, Beveridge-Nelson decomposition etc.* (see Ladiray et al (2003), Nachane and Dubey (2011) etc.). The calculation of the equilibrium velocity V* depends on whether it is *stationary, difference stationary, trend-stationary or trend-stationary with or without structural breaks* (see Hoeller and Poret (1991), Nachane and Lakshmi (2002), Pallardo and Esteve (2000) etc.)

[2] The money multiplier and high-power money are usually defined by $k = \left(\frac{c+1}{b+c}\right)$ and $H = C + R$ where C is currency with the public, R the reserves with the banking system, c is the ratio of currency to total deposits and b is the ratio of bank reserves to total deposits. We use an equivalent but slightly different definition of H in the text.

[3] NDAs are comprised of central bank credit to the government, to commercial banks and to the commercial sector.

[4] In *the long run*, p is expected to converge on p^*.

[5] Angeriz and Arestis (2007) present the model with a strong critical thrust.

[6] This view is also taken by one leading strand of post-Keynesianism viz. that based on Kalecki's (1943) two-class model.

[7] The article by Noyola is in Spanish. We have relied heavily on Danby (2005) to interpret his position.

[8] Two of these works are in Spanish and we rely on Vernengo (2007) to get a gist of their contents.

[9] The two concepts are similar but not identical. The RBI defines 4 measures of money supply (M1 to M4) and 3 measures of liquidity (L1 to L3). M1, for example includes currency with the public plus demand deposits with banks and other deposits with the RBI, whereas M3 additionally includes time deposits of the banking system. The 3 liquidity measures are defined as (i) M3 plus postal deposits (L1) (ii) L1 plus liabilities of financial institutions (L2) and (iii) L2 plus public deposits with NBFCs (L3).

[10] A detailed discussion of these models is given in Nachane (2018), p. 89-93

[11] An empirically manageable baseline demand for money function embodying these considerations may use a single long-term rate on securities as capturing the expected future short-rates (see Brunner (1983), p.50)).