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Foundations**

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Working Paper # 2005-8

September 2005



***RBC Financial Group
Economic Policy Research Institute
EPRI Working Paper Series***

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Monetary Policy and its Theoretical Foundations*

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Abstract: This paper briefly discusses why a monetary policy framework that emphasises interest rates has become standard in recent years, and why so many economists have been persuaded simultaneously to downgrade the importance of monetary aggregates. Then it describes Michael Woodford's particular contribution to these developments, and contrasts it with a more traditional approach to the theory of money that stresses its means of exchange role. It suggests that, though there are difficulties aplenty with the latter, Woodford's cashless simplification of the monetary economy presents problems of its own, both for monetary theory *per se*, and for the discussion of currently relevant monetary policy questions. It concludes that the theoretical basis for monetary policy should embrace wary eclecticism..

Key Words: Money, Interest Rates, Inflation, Monetarism, Cashless Economy, Open-market Operations.

JEL Classifications: E10, E31, E42, E44, E52, E58.

*Keynote address delivered at the 2005 SUERF - Bank of Finland Conference on "Open Market Operations and the Financial Markets" Helsinki, Sept. 22, 2005. I am grateful to my discussant on that occasion, Jan Toporowski, as well as to Perry Mehrling, Colin Rogers and Dan Thornton for helpful comments on an earlier draft.

Stocks of assets and the yields they bear have usually been recognised as playing interdependent roles in monetary policy's transmission mechanism, but there has often been disagreement about matters of emphasis. In the last decade or so, there has been a growing tendency, particularly on the part of policy makers, to stress yields and downplay stocks, and this way of looking at things has recently received a major theoretical boost from Michael Woodford's masterly (2003) monograph *Interest and Prices*.

Woodford's work is important not just because it provides a particularly thorough set of analytical foundations for the framework that nowadays routinely underpins the day to day conduct of monetary policy in many central banks - the *standard model* as I shall term it here - but more critically because it proposes that the theoretical fundamentals of policy-relevant monetary analysis are best grounded in a model of a *cashless economy*, one in which stocks of monetary assets play no essential role. Open-market operations, the topic of this conference, involve transactions in stocks of financial assets, and such a theoretical approach would necessarily downgrade their policy-significance; so this conference is timely, because it presents an opportunity to examine Woodford's advice from both a theoretical and a practical standpoint.

In Woodford's model, central bank money is the economy's unit of account, and the critical policy variable under that same central bank's control is the rate of interest on loans denominated in it. He acknowledges that, in the world as it is, central banks might use open market operations in overnight loans to control that interest rate, but he also looks forward to the time - which has already more or less arrived in some jurisdictions - where the critical variable for monetary policy is the corridor between the rates of interest at which the central bank itself borrows and lends to the market. He therefore treats open market operations aimed at keeping the overnight rate in its chosen corridor as an inessential technical detail, of interest to those who actually implement policy, but not to those who seek to understand how it affects the economy.

Similarly, though Woodford agrees that there do exist frictions in real world economies that give rise to a determinate demand for stocks of their means of exchange, he also argues that the interaction of the stocks supplied and demanded of them has trivial effects on other variables and may safely be neglected. Hence, he is quite comfortable with a theoretical foundation for monetary policy that ignores money's means of exchange role altogether, as well as the behaviour of inventories of money to which this role gives rise. This paper will argue that to abstract from these factors is to deprive monetary economics of a significant part of its policy

relevance.. It will touch on open market operations as and when their role in monetary policy processes is relevant to the argument, but its main concern is, nevertheless, the broader context of the theories of money that must always lie in the background when questions about monetary policy are discussed.

1. What Went Wrong with Monetarism

This is not the first time that the importance of monetary aggregates has been downgraded to essentially zero by important economists. It is a well known paradox that the work of John Maynard Keynes on what he thought of as a “monetary theory of production” set in motion developments that culminated in the “Radcliffe view” of monetary policy. This view, as expressed by Richard Sayers, had it that monetary policy works through rates of interest and the availability of credit and hence was better conducted by directly influencing these variables than by trying to influence the quantity of money, and it also embraced the opinion, as expressed for example by Richard Kahn in 1959 that “The velocity of circulation . . . is an entirely bogus concept . . . an effect and not a cause” of “variations in the level of economic activity and prices”.¹

Coupled with the view that inflation was largely a matter of sociological cost-push rather than monetary forces, opinions like these (though not always so extremely held) dominated the design of monetary policy in the 1960s and early 1970s, which in due course generated the inflation that would discredit them. Thus was the scene set for so-called monetarist anti-inflation regimes that gave pride of place to the rate of money growth. These relied on the view that, rather than being a “mere statistic”, velocity was a well determined structural parameter, derived from an equation in which the economy’s demand for money was a “stable function of a few arguments”². As everyone remembers all too clearly - particularly those who were involved in the efforts of various central banks to implement them - these didn’t work very well either. Monetarist views were not totally discredited by the experience, for inflation did turn out to be mainly a matter of monetary policy and it was brought under control. However, demand for

¹As quoted in Laidler (2004a, ch.14 [1989], p.333), a paper in which a fuller discussion of the Radcliffe view, and of the evidence upon which it was based, is to be found.

²The phrase is Milton Friedman’s (1956). It is worth noting that Friedman’s own main effort to give it empirical content (1959) used business-cycle average data, a far cry from the monthly and quarterly observations that were used when the demand for money function began to be used for guiding policy. How claims to stability came to be uncritically stretched so far would be well worth studying.

money functions turned out to be less stable than expected, and certainly too fragile to serve as a fulcrum for the conduct of day to day monetary policy.

In due course, therefore, money growth targeting gave way to more or less formal inflation targeting regimes. The transition here was often a rough one, but central banks now seem to have learned how to make inflation targeting work. This change did not involve any immediate and fundamental revision of their operating procedures, however. Most proponents of money growth targeting had argued for its implementation by way of control of the monetary base, which would have tended to give open market operations a more central role in the day by day conduct of monetary policy than they in fact occupied, but this debate was lost. Central banks instead tried to control money growth by manipulating short term interest rates, and when they turned to aiming at inflation directly, they continued to rely on short term interest rates as their policy instrument.³

Though demand for money instability played an important role here, a more fundamental problem was that central banks' efforts to control money growth were based on a model of the determination of the money supply that was incompatible with the theory of monetary policy upon which the case for such a regime rested in the first place. This case had it that money growth affected inflation through its influence on nominal aggregate demand, and was supported by a large literature documenting long and variable time lags between changes in money growth and their ultimate effects on output and prices.⁴ When central banks implemented money growth targeting, however, they did so by using estimated demand for money functions to forecast the

³This is not to say that there was no evolution in the conduct of monetary policy. Nowadays its centrepiece is the interest rate on overnight loans of central bank deposits. At one time the rate of interest on short-term government debt, for example 3 month treasury bills, was the critical variable, But the evolution here had nothing to do with the abandonment of money growth targeting.

⁴And variations in money growth still lead output and inflation. To generalise, narrow aggregates seem to display a longer lead than broader aggregates, and observation that is consistent with their being closer to initial policy impulses, whose effects then ripple through portfolios as they simultaneously influence expenditure patters. For recent evidence on the leading indicator status of very narrow (base) money, See Nelson, (2003) , and for a powerful statement of the case that, such evidence notwithstanding, it is broad aggregates that have the greater strategic importance, see Tim Congden (2005). The issues raised by these papers require more attention than there is space to give them in this paper.

demand for money, given the current and forecast behaviour of prices and output, and then set interest rates to bring the quantity of money demanded into line with their targets. In this scheme of things, money growth is a lagging, not a leading, variable. So, while the theory that justified money growth targeting treated money as *actively determining* the future behaviour of output and prices, it was put into practice by treating money as *passively reacting* to their current and past behaviour: small wonder that policy regimes based on such a massive contradiction went wrong.

These practical failures were not the only reason for the downgrading of monetary aggregates as a centrepiece for policy, however. Theoretical developments also played their part. Monetarism evolved into New-classical economics in the 1970s, with the “money- supply- surprise” model of the business cycle as its centrepiece, and its academic exponents paid no more attention to well-established evidence on the temporal ordering of money supply, output and price level fluctuations than did policy makers. This model’s aggregate supply side had output moving in response to mis-perceived price level variations and it was therefore grossly inconsistent with the fact that output systematically leads inflation over the cycle. When real business cycle theory gave up the idea that monetary impulses were an important source of shocks to the economy, this was, in some measure, an attempt to preserve New-classical assumptions of clearing markets and rational expectations in the face of this awkward fact.⁵

Disappointments about the stability of empirical demand for money functions also led to a search for “sound micro-foundations” for models of the demand for money. Paul Samuelson’s (1958) over-lapping generations model was much favoured for this purpose for a while, and in this framework, money is a pure store of value. It was not difficult to construct versions of it in which other stores of value are perfect substitutes for money, and then to show, for example, that, in such circumstances, changes in its quantity, including those brought about by open market operations, can have no effect on anything. The search theoretic alternative to the over-lapping generations model as a micro-foundation for monetary theory did, and does, have the all-important merit of taking money’s means of exchange role seriously, but for a long time it remained (some would say it still does remain) wedded to models so remote from any actual economy than not even their most ardent supporters could claim any policy relevance for them.

⁵It was only in (1996) that Robert E. Lucas himself acknowledged the difficulty created by this fact for the model which he had pioneered.

In short, these approaches to the micro-foundations of money offered no immediately useful theoretical insights for policy makers.

Nor was any way out of this impasse to be found in cash-in-advance set-ups. These either assume a constant velocity of circulation, or predict one inversely related to the rate of interest in the cash-or-credit variation on them first proposed by Lars Svensson (1985), and traditional models of the demand for money that had already proved inadequate for policy purposes had been able to get much closer to the facts than this. In such a theoretical vacuum, it is hardly surprising that researchers at central banks, having bid “a not-so-fond farewell” to the LM curve - to borrow Benjamin Friedman’s (2004) phrase - continued to refine their own in-house approaches to monetary policy to the point at which it is now possible to talk about a standard model in which any role for monetary aggregates is simply by-passed.⁶

2. The Standard Monetary Policy Model

Three basic building blocks make up this standard monetary policy model. The first of these - some form of IS curve - links the level of aggregate demand for goods and services to the rate of interest; the second - some form of expectations augmented Phillips curve - links the rate of inflation to the “gap” between aggregate demand and some long run equilibrium level of aggregate supply; while the third is a central-bank policy reaction function - a Taylor rule - linking the rate of interest set by policy makers to actual or forecast inflation, and often to the so-called output gap as well.

An enormous literature has tried to fill in the details of this broad framework. One way of reading Woodford’s *Interest and Prices* is as just another, particularly careful, variation among many on this theme, but to do that is to sell both the book’s ambition and accomplishment seriously short. At each step in the construction of his basic model, and in each extension of it, the choices that Woodford makes turn the finished product into a work well calculated both to bridge crucial gaps in the literature to which it contributes, and to provide a basis for future work as well. Woodford’s book attempts, that is to say, to define the foundations of a new research agenda in monetary economics, just as, in their own ways, did Wicksell’s *Interest and Prices*

⁶As Daniel Thornton has pointed out to me, it is often hard to discern even the outlines of this model in the minutes (where these are published) of meetings at which interest rate decisions are actually taken by central banks. Nevertheless, it does seem to inform a great deal of the research work that underlies those decisions.

(1898) whose title it self-consciously borrows, Keynes' *General Theory* (1936) and Patinkin's *Money, Interest and Prices* (1954). Each one of these addressed issues with which their authors' contemporaries were also grappling and, with a judicious mix of ideas already in the literature and original insights, found just the right simplifications to enable old problems to be clarified and new ones to be formulated.⁷

Woodford's over-riding aim is provide micro-economic fundamentals for today's standard monetary policy framework, as a means of insulating the latter from Lucas-critique related errors, to be sure, but more broadly as a means of finally eliminating the chasm that opened up between pure monetary theory and policy modelling after the abandonment of the monetarist experiment. The basic simplification that he deploys towards this end is, as Bennett McCallum (2005) has ironically noted, to eliminate *Money* from *Money, Interest and Prices*.⁸ Central banks had already taken this step because of practical problems in implementing policy, but Woodford (2005a) defends it as a means of by-passing the as yet unsolved, and in his view probably insoluble, theoretical problem of providing a sound micro-foundation for monetary policy in a model that takes money's means of exchange function seriously. His cashless economy embodies the bold hypothesis that, in the world for which policy is made nowadays, the frictions that give rise to demands for stocks of various monetary aggregates are sufficiently trivial to warrant ignoring them altogether, and he is willing to have his work stand or fall by the usefulness of the resulting models.⁹

⁷Wicksell's self appointed task was to adapt the quantity theory of money to the facts of a monetary system still based on gold but increasingly dominated by deposit banking, and to provide a guide as to how that system could shed its dependence on specie convertibility; Keynes's tackled problems of co-ordinating saving and investment in a monetary economy, showed why the rate of interest might not be up to this task, and how this failure could led to unemployment; and Patinkin's concern was to provide a foundation in maximising microeconomic theory for the conventional macroeconomic model that, by the 1950s, had emerged from Keynes's work to dominate the conduct of policy.

⁸And, it must sadly be noted that, perhaps inadvertently, Woodford (2003) includes neither *Money, Interest and Prices* in his bibliography, nor Patinkin's name in his index.

⁹Woodford is not the first economist to suggest that monetary theory should proceed along such lines. As Perry Mehrling (2005) has reminded us, Fischer Black had been there before him, but where Black's work seemed to run quite counter to contemporary policy practice, Woodford's now blends seamlessly into it.

No variable is more central to monetary policy these days than the *output gap*, and in Woodford's model, it is represented by the difference between aggregate demand (and hence actual output, for markets always clear in his model) and the level of output that would prevail were consumers' forward looking maximising choices about the allocation of their consumption over time in harmony with what its production sector would provide along its equilibrium growth path. Thus, a concept long embedded in the policy literature as a useful holdover from the Phillips curves of the 1960s and '70s, is, in Woodford's model, firmly grounded in the micro analysis that forms the basis of real business cycle theory. And once the output gap is conceived of in these terms, a corresponding *interest rate gap* follows, because there is a *neutral* value of the real rate of interest that will rule when the economy is on its equilibrium growth path. Monetary policy is thus seen to have its impact on the economy by creating deviations of the actual real rate from this value. And it is, of course, straightforward to deploy the Fisher effect in order to re-express these relationships in terms of the nominal interest rate.

In his treatment of the output gap, Woodford thus not only connects theoretical fundamentals to policy modelling, but also, within pure theory, the New-classical and New-Keynesian traditions. Overlapping price contracts in the style of Calvo (1983) represent a further New-Keynesian element in his basic model, needed to slow the response of the overall price-level to demand shocks and hence to produce the empirically appropriate ordering of output and inflation responses to monetary policy. The basic model is then completed by attributing rational expectations to the agents inhabiting its private sector, and by having policy makers use a rule of the type investigated by John Taylor (1993) as they try to achieve a target inflation rate.

The resulting model yields two key results for monetary policy. The first is that the critical variable that policy must control is not the level of the nominal interest rate, but the gap between that rate's actual value and its neutral level, itself an endogenous variable; and the second is that, in responding to changes in inflation, the authorities should move that gap by more than those changes; the rationale here being that what is required of policy is to offset the influence of the change in inflation on the inflation expectations that underlie the nominal value of the neutral rate, as well as the change in its real component that is associated with the shock to demand that moved inflation in the first place. Given a rule of this type, Woodford shows - here, even more so than McCallum (2005), I am willing to take his word for it - that his basic model will generate a stable equilibrium inflation rate that agents are able to learn about and use as an

anchor for the very inflation expectations that support the equilibrium in question.¹⁰

Woodford analyses one extension of his model that introduces frictions of a type necessary to create a demand for money, and another to deal with some of the complications that are created by permitting investment to influence the time path of the economy's capital stock. He shows that neither modification makes any essential difference to the basic model's properties, and in later work (Woodford 2005a), he also demonstrates that the construction of an open economy version of the system, with a determinate time path for the exchange rate, is also feasible. In short, he goes to considerable pains to show that his fundamental results are robust to just the kind of complications that a policy maker might want him to deal with.

3. Scarcity and Money

Markets always clear in Woodford's basic model, and when he brings money into it, he does so by introducing certain frictions into its operations. There is nothing here to set this model apart from a great deal of recent work, but they are symptoms of a very odd - Colin Rogers (2005) would say totally wrongheaded - approach to providing sound micro-foundations for a theory of monetary policy.

We routinely instill into our students the lesson that scarcity requires economic agents to make choices, but we are all too often less careful about drawing their attention to a second implication of scarcity: namely, that if choices about the use of the economy's endowments are to be left up to individuals in a multi-agent economy, then a structure of property rights and a system that facilitates their orderly and voluntary exchange are needed to co-ordinate these choices. If, of course, we required that every application of the theory of the allocative and distributive functions of a market economy be grounded in an explicit discussion of the property law and the mechanisms of exchange that characterise it, economic analysis would become too cumbersome to use. It is just as well that, for many purposes, we can take the existence of well-established property rights for granted, and can also adopt the fiction that their voluntary exchange is presided over by an auctioneer who always sets prices at their market clearing values and then ensures that buyers and sellers find one another without costly search. But this

¹⁰The practical problems of implementing Woodford's recommendations that stem from the difficulty of actually measuring the output gap and estimating the neutral value of the interest rate are worth mentioning here. So far these have not led inflation-targeters into serious policy mistakes, but one wonders just how long their luck will hold out.

usually useful simplification does not work for all purposes, and in particular it cannot work for studying the fundamentals of money.

To assume that markets always clear is to assume that agents' choices are always fully co-ordinated by the market, and that the economy's mechanisms of exchange never break down. But the monetary system is an essential component of those mechanisms, and though the monetary systems we encounter in the real world might always work this way, then again they sometimes might not. Either way, however, this outcome should be a prediction of the theory of money that we use to analyse them, and not an assumption upon which that theory is based. A micro-economics that assumes that money always and everywhere successfully performs its means of exchange function cannot, as a matter of simple logic, provide a proper basis for studying how and whether it does so. That is surely why, when economists have tried to find micro-foundations for a theory of money while maintaining market clearing assumptions, they have ended up treating it as a pure store of value - the over-lapping generations model - a unit of account - Woodford's cashless economy - , or by imposing apparently arbitrary exogenous restrictions on the market's working - a cash in advance constraint, or Woodford's "frictions" - and it is also why the outcome of such attempts is always unsatisfactory .¹¹

Furthermore, a theory of money adequate for policy purposes must provide guidance when things go wrong, and a theory that has markets always clearing can only deal with the consequences of mistaken information. If it also attributes rational expectations to agents, it can only deal with the consequences of errors that, *ex ante* at least, are random. On these assumptions, co-ordination failures, which, as Leijonhufvud (1981) demonstrated, provided the monetary economics of the inter-war and the early post-world-war 2 era with much of its subject matter, do not happen and therefore cannot be studied. Now if we had an alternative fully worked out theory of the fundamentals of monetary exchange, we could simply stop the discussion at this stage by directing attention to it, but we don't. Woodford (2005a) is right to argue that there is still far too much about work along these lines that is contrived and divorced from reality for it to offer any early promise of providing a useful micro-foundation for policy

¹¹That money's most fundamental function is the means of exchange is attested to by the fact that, when monetary systems break down under hyper-inflationary pressures, local currency is replaced by some other money (typically the US dollar) first of all as a store of value, then as a unit of account, and only finally as a means of exchange. See Daniel Heymann and Axel Leijonhufvud (1995)

analysis.¹² He is, however, wrong to agree with, for example, Neil Wallace (2005) that until it does so, the more traditional models of money that underpinned the monetarist experiment must be altogether shunned.

4. Traditional Monetary Theory

The very idea that there exists a set of fundamentals which, once discovered, will prevent capable logicians who understand them from making false propositions about the economy's response to policy measures (among other disturbances) is unscientific.¹³ Even if such fundamentals existed, and even if we did understand them, we would have no way of empirically verifying either fact. Of course we should always be trying to derive policy relevant results from premises of greater and greater generality, whose empirical implications have been tested against an ever wide range of evidence; but no matter how far we carry this process, we shall always remain open to the risk that our theory will let us down at a crucial juncture. To argue that traditional monetary theory exposes us to such a risk, then, is to not argue for abandoning it, but for attempting to improve it even as we continue to use it, albeit always with a sceptical eye on the outcome.

As we have seen, moreover, the fundamentals of monetary exchange exist in the same intellectual stratum as those of property rights. It is surely inconsistent to insist that the ability to derive the institutions of monetary exchange from deeper postulates is a necessary prerequisite for taking notice of their existence in policy analysis, while simultaneously taking property rights for granted when we study the consequences of trade in them for questions about allocation, growth, distribution and so on. It would be intellectually satisfying to be able to make

¹²Recent formalisations in terms of search theory of ideas that go back at least to Carl Menger (1892), and indeed to Adam Smith (1776, Book 1, Ch.4) and beyond, have nevertheless made considerable progress. They began with model economies with three commodities, in which isolated agents, endowed with a single indivisible unit of one of them and meet at random, and in which indirect exchange can be shown to arise (eg. Kiyotaki and Wright 1989). Now we have systems in which institutions that look very much like deposit taking banks can emerge (eg. He, Huang and Wright 2005). It should also be noted that the less technical Austrian tradition begun by Menger also continues to flourish as a distinct entity. See eg. Selgin and White (2002)

¹³For far more thorough methodological critiques of Woodford's approach than are offered here, see Hoover (2005) and Rogers (2005), both of which have surely influenced this paper more significantly than one brief footnote might indicate.

such tight connections in either case, and probably it would sometimes be very helpful too, but until we can do so, we do have to get on with our economics. Woodford has chosen to investigate the policy implications of a cashless economy as his way forward, and he is explicit (2005b) about being willing to have his results judged by their empirical relevance and policy usefulness. A more traditional approach should surely be judged on the same criteria.

That more traditional way of dealing with monetary questions requires only the briefest of sketches.¹⁴ It starts from the proposition that, in an economy co-ordinated by monetary exchange, where the same item usually serves as both means of exchange and unit of account, economic agents face serious problems of collecting the information required to make certain critical decisions. The prices at which they can trade need to be discovered and/or, particularly in the case of firms, they need to be set and transmitted to potential customers. Both activities use real resources, including time and effort. The configuration of the marginal costs and benefits associated with them will usually lead to the amount of information that it is optimal to collect being less than all that is potentially available in the market-place, so that this traditional theory has trouble accommodating rational - as opposed to merely unbiased - expectations. That configuration will also lead to prices being changed not continuously as the economy evolves, but at discrete intervals that may be unco-ordinated across markets. For individual agents therefore, errors, small and sometimes not so small, are likely to be frequent, and they can partially protect themselves from their adverse consequences by holding inventories - buffer stocks - of the economy's means of exchange.

The cheaper it is to hold money, moreover, the fewer resources will agents devote to price setting and information generating activities. Money holding may thus, broadly speaking, be said to economise on "shopping time" - to borrow McCallum and Goodfriend's (1987) useful phrase - and resources devoted to it have alternative uses in gathering market information and making pricing decisions. The quantity of money demanded, the amount of information used in

¹⁴Alan Rabin's (2004) account of the broad approach I have in mind here deserves more attention than it seems to be getting. Though often associated with so-called *Post-Keynesian* economics (eg. Rogers 2005), the idea that an economy characterised by monetary exchange is fundamentally different from a Walrasian system is also to be found in Monetarist literature. For a recent example, see Daniel Thornton (2000) My own earlier expositions of some of the implications of this idea are to be found in Laidler (1997, Chs. 8 [1974], 13 [1984] and 14 [1988]).

making decisions, and the economy's degree of price stickiness are thus jointly determined endogenous variables, and the terms of the trade-offs among them, and hence the stability of the behaviour to which they give rise, are likely to depend upon deeper characteristics of the economy's mechanisms of exchange. Because we do not know nearly enough about the latter, the qualms of economists such as Wallace (2005) and Woodford (2005a) about the unthinking application of traditional analysis to policy need to be taken very seriously; but we should not ignore its implications altogether.

Traditional analysis tells us, for example, that there exists, at the level of the economy as a whole, a demand for money function with certain generic characteristics: a unit elasticity of demand with respect to the general price level, a positive elasticity with respect to some such scale variable as real income and/or wealth, a negative elasticity with respect to the opportunity cost of holding money (or costs in systems where more than one margin is relevant), and perhaps a positive one with respect to some measure of the value of the time and trouble saved by holding money. Empirical evidence largely confirms these predictions, and even if the parameters of empirical demand for money functions are not stable enough to bear the weight of day to day monetary policy, they are more than well enough determined to refute any idea that velocity is a "mere statistic". These parameters are also of orders of magnitude that imply that a necessary and sufficient condition for inflation to persist at a noticeable rate for any period of time is money supply growth significantly in excess of that of real output.¹⁵ As an empirical matter, moreover, money growth is not merely correlated with inflation. It leads inflation, with variations in output occurring in the interval between changes in these two variables. Traditional monetary theory, moreover, explains why this should be so.

In the case of changes in money growth generated when governments vary the extent to which they finance their spending by borrowing from the central bank, the pace at which new nominal money is forced into circulation also changes, creating a discrepancy between the time path of the amount of it that must be held, and that of the amount which the private sector is

¹⁵The critical parameters here are, of course, the price level and real income - more generally scale variable - elasticities of demand for money. A recent meta analysis of estimates of the latter parameters by Marcus Knell and Helmut Stix (2005) shows that they display considerable variation across countries, and some variability across aggregates too - broader aggregates have higher elasticities of demand than narrow - but leaves little doubt that they represent an aspect of the economy's structure rather than some co-incidental statistical artifact.

willing to hold. A discrepancy is created between the own rate of return on money and those on other financial and real assets, and this in turn, impinges upon the private sector's demand for other financial assets and upon its spending on goods and services, as agents attempt to return their money holdings to their desired time path. With the government choosing the rate at which new nominal money is injected into the system, however, this last step cannot be accomplished by an economy-wide correction in the time path of nominal balances. Adjustment ultimately takes the form of a variation in the inflation rate, which is itself the aggregate consequence of individual prices responding to variations in spending on specific goods, both durable and non-durable, and services too.

Matters work in just the same way when variations in money growth arise not from transactions between the banking system and the government, but between that system and private borrowers. This is even so when the initiative to such transactions is taken by borrowers rather than the banks, which is typically the case when monetary policy is conducted by controlling a short term interest rate. Agents who vary their borrowing from commercial banks seldom do so in order to adjust the time path of the stock of money they hold, but to vary their acquisitions of new nominal balances to spend; and those with whom they then transact in the markets for goods services and financial assets find the time path of their cash balances deviating from what was planned just as surely as do those who transact with government in exchange for money newly created for that purpose.¹⁶

It is true that, in a sophisticated monetary system, one way open to individual agents to vary their money holdings, particularly narrow transactions-related money, is by transacting with a bank, either increasing or decreasing debt, or holdings of less liquid bank liabilities, thus varying the amount of narrow money in circulation. Money creation and destruction in the presence of a modern banking system is not the same simple process as when the mythical

¹⁶Some would argue that the impact of money created to finance government expenditure is greater than that created by private borrowing, because the first represents a net increase in private sector wealth, while the second is offset by an increase in private sector indebtedness to the banking system. This, however, is to overlook the effect on the value of the banking system's equity of a simultaneous increase in its interest bearing assets and non-interest bearing liabilities. This result was firmly established in the debate that followed the publication of Pesek and Saving (1967) - see for example Laidler (1997, Ch. 4 [1969]) - and rests on reasoning similar to that which later figured in the debate about the "Ricardian equivalence" of debt and tax financed government expenditure.

helicopter is involved, because, in this case, there is no unique asset that can be readily identified as “money”, the size of whose stock is determined completely exogenously to the decisions of non-bank agents. Nor, however, as I argued at length in Laidler (2004b), is the quantity of money whether narrowly or broadly defined simply the result of the banking system’s passive response to variations in those agents’ demands for money-to-hold (except in theoretically limiting cases of dubious empirical relevance). It is rather the consequence of their interactions with the banking system, not just in the market for that system’s monetary liabilities, but in the markets for its non-monetary liabilities too, not to mention the market for bank credit.

The standard model of monetary policy and Woodford’s basic model of the cashless economy both bypass the analysis of these complex interactions, and posit a direct link between the interest rate that the central bank sets and the volume of private sector spending, and perhaps in quiet times under an already well established inflation targeting regime, it does no real harm to think of policy in such terms. The movements in short-term interest rates on which these models focus act as proxies for those in the wide variety of other yields, including implicit own rates of return on money and on stocks of durable goods, that the traditional approach suggests are also important, and perhaps they tell policy makers enough to keep their actions on track. But there are other questions in monetary policy than how to hit an inflation target in a tranquil environment. In dealing with them, analysis of money’s means of exchange role, and of the interactions among supplies and demands for inventories of financial assets to which that role gives rise, has a lot to say that is useful.

5. Choosing a Policy Regime

The very existence of inflation targeting regimes in a number of places is itself the outcome of policy choices. Such a monetary order is one among many that have either been tried or proposed in the past, it has not yet been universally adopted, and alternatives to it are either in place or on the menu in many places, even in the financially advanced economies to which Woodford’s theorising seems most immediately relevant. The least we can ask from a theoretical foundation for monetary policy is that it should offer some guidance about these matters, and there is much to be said in favour of the traditional approach here when it is compared to the cashless economy.

It is only five years since the Euro emerged as a fully fledged currency in the European Union, and even now, there are important members of the Union, including three “old European”

countries, who still face the choice between adopting it or keeping their own currencies, while in Canada and Mexico, there are vocal and influential domestic lobbies that would replace those countries' domestic currencies with the US dollar as a means of establishing a common currency for the NAFTA as a whole.¹⁷ The cashless economy model is silent about the effects of the number of currencies circulating in a market on the transmission of price information - the question of transparency - and on the resources eaten up in trade across monetary boundaries - the question of transactions costs - but both issues loom large in these debates. The model's assumption that markets always clear, furthermore, distracts attention from important political questions about the effects of monetary policy on their functioning when political and monetary boundaries no longer coincide with one another. In short, the economics of the cashless economy offers us very little help with some very important, and highly relevant, policy choices.

These competing orders are by no means the only ones that we might want to discuss, moreover. Forty years ago, for example, the mainstream choice was a monetary order firmly based on a national currency, with the central bank's principal task being to support the elected government's fiscal policy. When the latter was expansionary, as it often was, the effects of keeping interest rates low so as not to interfere with its effects led to central banks collecting seigniorage on behalf of the political authorities. Monetary policy of this sort in the US in the 1960s and early 1970s, albeit complicated by the need to finance the Vietnam war, was an important source of the inflation that would eventually destroy the Bretton Woods system.¹⁸ Indeed, for as long as governments have found themselves short of revenue, they have looked to seigniorage, and it is hard to think of any significant inflationary episode in recorded history that

¹⁷ Sweden and the UK are domestic inflation targeters which successfully deploy versions of the "standard model", while Denmark maintains a fixed exchange rate on the Euro. Meanwhile the European central bank pursues "price stability" - an asymmetric inflation target that stresses an upper bound - using "two pillars", one a version of the "standard" model and the other a "reference value" for broad money growth. Canada and Mexico are domestic inflation targeters, while there are serious proposals for the US, currently constrained by law to pursue both inflation and employment goals, to do likewise.

¹⁸The link between US budget deficits and money creation under the Bretton Woods system was complicated by the fact that monetisation of US debt acquired through current account surpluses was carried out by member countries of the system, rather than by the Fed. itself. Similar forces seem to be at work now, and threaten to undermine the stability of the Bretton Woods-like system of fixed exchange rates on the US dollar that has developed among South East Asian countries.

was not underlain by monetary expansion driven by fiscal requirements, and of any successful monetary stabilisation that was not supported by budgetary reforms. There is, that is to say, much wisdom in Thomas Sargent's wry variation on a theme of Milton Friedman, that "inflation is always and everywhere a fiscal phenomenon." In a cashless economy, however, there is no stock of real balances on which an inflation tax can be levied, and a theory of monetary policy based on that model does not even permit us to see the point of Sargent's joke.

Though seigniorage is a trivial source of current revenue in modern inflation-targeting economies, we still need to pay attention to these matters. Sargent and Wallace's (1988) "Unpleasant Monetarist Arithmetic", derived from a very specific model of how expectations about a future inflation tax, resulting from current bond-financed deficits, can affect an economy's current behaviour. It was far fetched, but was nevertheless based on an important and valid insight about the fundamental inter-connectedness of fiscal and monetary policy through the government's budget constraint. Canada after 1991 provides an example of inflation-targeting as close to Woodford's ideal of such a regime as one could reasonably get, and from the outset, inflation targets were achieved - even over-achieved at first. Nevertheless, as Laidler and William Robson (2004, pp. 106-111) show, long-term inflation expectations remained stubbornly high until early 1995, and the economy's real performance was disappointing too. It is hard to believe that the Canadian Federal Government's 1995 budget, which finally put a high and rising public debt to GDP ratio onto a sustained downward path, did not have something to do with sharp fall in long-term inflation expectations and the more or less simultaneous improvement in the economy's real performance that began the following year. Or, to give another example, the fact that the European Central Bank is forbidden to finance the expenditures of member governments, and is not doing so at present, does not eliminate concerns that this arrangement might prove politically unsustainable in the future under the weight of the debt that some of those governments are accumulating - the Growth and Stability Pact notwithstanding.

In short, though the cashless economy provides a theoretical foundation for analysing and designing policy for one particular kind of monetary policy regime, it needs help from a more traditional approach when the properties of that regime are compared to those of others, and also when the inter-connectedness of monetary and fiscal policy within such a regime are

considered.¹⁹

6. Financial Stability

A similar conclusion holds when we turn to questions about financial stability and the responsibilities of central banks for maintaining it, a policy issue that is, incidentally, central to present day discussions about the place of open-market operations in monetary policy.

Asset markets seem less likely to be unstable when low inflation is firmly in place, but there are examples of problems arising when the overall inflationary climate is benign - the United States' "Great Contraction" of the early 1930s, Japan's collapsing "bubble economy" in the early 1990s, to mention only two. The instability in question seems to involve not just financial markets, but those for real assets too, and seems to arise in specific sectors - real estate for example. It is not surprising, then, that the monetary aggregates seem to provide less reliable early warnings of trouble than does bank lending for the acquisition of particular assets. Even so, such credit indicators can still herald trouble that has economy-wide repercussions if it gets out of hand: an erosion of banking system capital, widespread depressed expectations about profit opportunities; downward pressure on interest rates; and even generalised real stagnation. All of this leads to two questions. Should inflation targeting regimes be complicated by adding the avoidance of asset-market bubbles to their goals? And, regardless of the answer here, what should be done after a bubble that has gotten out of hand bursts?

The cashless economy model can, as Woodford has shown, accommodate questions about the allocation of investment across sectors of the economy, so it ought to be able throw light on the central issues that must face any central bank that wishes to control exuberance in a particular sector: namely, how can monetary policy, which is inherently economy-wide in its impact, be used to address problems in a particular sector without risking unhappy repercussions elsewhere? and if it cannot, how are the gains and losses of such measures to be traded off against one another? There are limits to what this model can do here at present, however, because it pays scant attention to the fact that investment not only affects the current level of aggregate demand in the economy but also the future size and structure of an imperfectly

¹⁹Woodford (2003) does analyse fiscal policy, but as an influence on aggregate demand. His cashless model does not permit consideration of its potentially direct effect on monetary policy through the government budget constraint.

malleable capital stock.

Here, as I argued in Laidler (2003), the debate seems to need guidance not only from traditional monetary models, but also from those in the Austrian, Swedish not to mention Robertsonian and Kaleckian traditions that focus on inter-temporal co-ordination failures. Given the neo-Wicksellian nature of Woodford's cashless economy model, it may well be susceptible to extensions along these lines.²⁰ Perhaps, though, it would have to give up the twin assumptions of rational expectations and clearing markets to accommodate them. Debates about financial instability make frequent references to accumulated imbalances in portfolios of real and financial assets, and it is hard to give meaning to such phenomena in an economy in which the only disappointments arise from random errors in expectations.

Similarly, the cashless economy model's capacity to deal with problems associated with the real stagnation that sometimes follows the bursting of an asset market bubble is unduly restricted. It forces this phenomenon to be looked at through the lense of the market - neutral interest rate distinction and, given that stagnation is associated with a very low value of the latter, it sees a basic difficulty in the fact that there is a zero-lower bound to the nominal market rate that prevents it being lowered far enough to promote recovery. Hence it points to the desirability of measures designed to raise inflation expectations in any chronically depressed economy. This is surely valid as far as it goes, but a more traditional approach would point to the desirability of also giving some thought to the interaction of the supply and demand for money.

Times when markets for goods and services, not to mention financial assets, appear to be working badly are likely to see an unusually high demand for money, and those very same conditions also make the private sector particularly unwilling to borrow from the banking system, a reluctance that inhibits the creation of the very money needed to satisfy this demand, let alone over-satisfy it to the point of inducing a renewal of expenditure. In short, as I have noted in Laidler (2005), at such times the traditional approach would lead us to diagnose what

²⁰The connections between Wicksell and Woodford are perhaps more tenuous than a quick reading of the latter would suggest, as Boianowsky and Trautwein (forthcoming) have noted. Let it be clear however that, as Woodford (2005b) has explicitly noted, he did not make strong claims in this regard in the first place. A discussion of recent developments in the Austrian style macroeconomics alluded to here is beyond the scope of this paper. The interested reader is referred to Roger Garrison's important and stimulating monograph (2001).

Ralph Hawtrey (eg. 1932) called a “credit deadlock”, and then to prescribe open market operations on whatever scale was needed to break it and promote recovery. Friedman and Schwartz (1963) recommended just such measures in hindsight as a cure for the great US contraction of 1930-33, as did a number of contemporary commentators, including Hawtrey himself and some of his associates, notably Lauchlin Currie (1934); and, in 1932, the Fed. did in fact undertake large scale open market operations for a few months. The Bank of Japan also belatedly implemented such a policy - which it called *quantitative easing* - beginning in 2001, on a very large scale for about 18 months, and more timidly thereafter. In the US case, the data can be read as suggesting that greater vigour might have provoked a more decisive response in economic activity in 1932-33, and, in the case of Japan, it now appears that a hesitant recovery has in fact been under way since 2002.

Perhaps then, the seemingly serious limit imposed on the powers of orthodox monetary policy by the nominal interest rate’s zero lower bound is not so much a property of the real world as of monetary policy models that focus too exclusively on interest rates and neglect the interaction of the supply and demand for money, and the scope for open market operations to shift the supply in question. In depression, just as in inflationary conditions, changes in money growth do seem to precede changes in output, which in turn do seem to precede changes in inflation, and the traditional approach to monetary economics tells us why this should be the case. We should ignore neither these facts nor the theory that seems to explain them.

7. The Attractions of Eclecticism

Much has been said in this paper about the limits of Woodford’s cashless economy model as a theoretical foundation for monetary policy. It has been argued: that no model which assumes markets always to clear can provide a suitable micro-economic basis for the theory of money; that the cashless economy is therefore better regarded as a useful but regime-specific simplification, particularly relevant to inflation targeting economies; and that the menu of policy questions to be discussed does not have to be much broadened beyond such a regime before the cashless model finds that its needs help from the very analysis that it seek to by-pass.

Thus, though we should warmly welcome the extra rigour that Woodford’s cashless economy brings to the standard monetary policy model that has proved so useful to inflation targeters in recent years, we should not let it distract us from certain older truths: namely, that

excessive money growth is necessary and sufficient for significant inflation and seems to be a leading indicator thereof, that it is often associated with loose fiscal policies, and that the latter can therefore have a deleterious effect on economic performance by way of their influence on longer term inflation expectations. Central banks that rely on the standard model to design their ongoing policies will find Woodford's work extremely helpful, but the behaviour of money still requires their attention, whether informally as, for example, in the case of the Bank of Canada, or formally as, for example, in the case of the European central bank. For the same reasons, a wary eye needs to be kept on fiscal policy too.²¹

Furthermore, the analytic usefulness and popularity of the assumptions of clearing markets and rational expectations notwithstanding, the co-ordinating mechanisms of real world economies do sometimes seem to break down, more often than not in inflationary environments, but sometimes even when the price-level is stable. Theoretical models that cannot encompass such failures cannot be trusted to illuminate them, and their implication that cutting short-term interest rates to zero exhausts the central bank's armoury in dealing with the stagnation that sometimes follows them, is misleading. Traditional theory suggests that it is precisely in such circumstances that open market operations should be promoted from the technical fringes of monetary policy to its very centre, and surely it is right here.

Even so, it has not been claimed that we should feel comfortable with a more traditional approach to the theory of monetary policy, or that its exponents have nothing useful to learn from Woodford: quite the contrary. Here, I would single out two areas of particular interest, namely his treatment of the output-gap interest-rate-gap inter-relationships and of Taylor style policy reaction functions.

Today's standard policy model evolved from an IS-LM system without the LM curve, while the more traditional approach continued to pay attention to that relationship. But both approaches have long utilised some sort of expectations augmented Phillips-curve to link aggregate demand to inflation, so both give an important place to the output gap in monetary policy's transmission mechanism. Even the crudest IS curve, moreover, when combined with the

²¹On the ECB's policy framework, and the role of money therein, See Otmar Issing (2004). Walter Engert and Jack Selody (1998) provide a compelling exposition of the Bank of Canada's views, which have much influenced this paper, on the need to deploy "competing paradigms" in the analysis and formulation of monetary policy.

idea that there is a “full-employment” level of output, invites a mapping from the output gap to an interest rate gap. Exponents of the traditional approach thus have much to learn from Woodford’s careful grounding of these concepts, and of the linkages between them, in the same micro-foundations that inform real-business cycle theory, not to mention his further linking of the Taylor rule to these same micro-foundations: this despite the difficulties that his approach is bound to encounter as it disaggregates over sectors, so that the values of the economy’s capital stock and neutral interest rate become variables that depend upon the structure of relative prices, and hence upon the interest rate set by the central bank.

There is room for fertilisation in the opposite direction too. One of the less attractive features of Woodford’s basic model is its reliance on Calvo contracts to generate price stickiness. Because the duration of these is fixed, they generate a hard to swallow long-run inflation-output trade-off within his system. It should be possible to incorporate the insights yielded by traditional analysis about the role of information and transactions costs in generating price stickiness, and of how agents’ willingness to incur these is likely to vary as the opportunity cost of holding money varies with inflation, into an extended version of Woodford’s framework. Such an extension would render its treatment of price stickiness less arbitrary, and also enable questions about long-run inflation-output tradeoffs to be further investigated. Since, however, this extension would also require explicit analysis of the effects of inflation on the demand for money, it might also show that this relationship is more relevant to policy analysis than Woodford initially suggests.

Such a conclusion would, of course, begin to compromise the idea of the cashless economy as a sufficient basis for the theory of monetary policy, while simultaneously strengthening the claims of a more traditional approach, but it still leaves too much that is tentative for anyone’s comfort. But if we are not at present quite sure how, or even whether, the various threads of contemporary monetary theory can eventually be woven together, it should also be reiterated that we likely never will be. The threads in question will change over time as the subject, not to mention the monetary systems it seeks to understand, evolve. Some of them are always likely to be loose, and we should never ignore any of them that appear to support useful policy insights. Sceptical eclecticism, even to the point of utilising apparently unrelated, even inconsistent, ideas to come to grips with different problems, currently seems to put monetary policy at less risk of error than single-minded devotion to any particular model, and it is likely to continue to do so in future.

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