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**Woodford and Wicksell on *Interest and Prices*
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Abstract: Knut Wicksell's "pure credit economy" and Michael Woodford's "cashless economy" have much in common but whereas Wicksell's model was developed in order to extend an already existing theoretical framework, Woodford's is presented as constituting, in and of itself, a foundation for the theory of monetary policy. But models of this type are sometimes inadequate guides to policy problems. This conclusion is illustrated with reference to international monetary issues and the so-called "zero-lower bound" problem.

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The Diminishing Significance of High Powered Money

There can be no doubt that the monetary systems of a number of advanced countries nowadays resemble Knut Wicksell's (1898) model of the "pure credit economy" much more closely than did any that actually existed in the world for which he wrote. Currency has long been losing its quantitative importance in mediating transactions among the general public in such countries, and more recently, the development of modern information technology has made it possible for them to operate the clearing and settlement systems that underpin the use of bank deposits as means of exchange with a close to zero stock of reserve assets.

In monetary systems like these, it is no longer necessary for the central bank to vary the quantity of high powered money in a systematic way to change interest rates, and the choice between discussing the conduct of monetary policy in terms of variations in that quantity, or of changes in the price of overnight money to the banking system, has ceased to be a matter of semantics. It now is a matter of substance, and the way in which central bankers have always thought about these things - interest rate control - has become the right way for academics to approach them too.

These important changes in the stylized facts require even the most traditionally inclined among us to treat Woodford's *Interest and Prices* extremely seriously, for it deals with the theory of monetary policy in an economy whose central bank uses an interest rate as its policy instrument within a decision making framework in which the role not just of high powered money, but of monetary aggregates in general, in the transmission mechanism is by-passed. Attention is focused instead on an "as if" direct relationship between the interest rate and aggregate demand. This is supplemented by an expectations augmented Phillips curve through which aggregate demand affects inflation, and a "Taylor Rule" linking the central bank's interest rate setting to inflation's behaviour, to produce the basic template for the class of models on which Woodford's book elaborates.

There should be a warm welcome for an exhaustive analysis of the properties of such a framework, especially when it is as masterful as Woodford's. Even so, modern monetary systems have not yet evolved into Wicksellian pure credit economies. Though some clearing and settlement systems nowadays (almost) do without a positive stock of high-powered money, deposits with the central bank remain the final means of settlement within them, while the activities of the non-bank public are still coordinated by a system of monetary exchange that requires a large positive stock of bank deposits (and a little currency) to keep it working. It is arguable, therefore, that, in those systems, the interaction of the supply and demand for money is still of central importance to the monetary policy transmission mechanism through which real income, employment and inflation too are determined.¹

¹How that importance manifests itself will, to be sure, depend on the nature what Brunner and Meltzer (eg. 1993) used to call "the money supply process", and how much of a role monetary aggregates can be given in any policy framework will depend on that, as well as upon the stability of their demand functions.

In what follows, I shall note that Woodford presents the modern approach to the theory of monetary policy as superceding an older one, which did indeed focus on the interaction of the supply and demand for money, whereas Wicksell, from whom Woodford's analysis draws inspiration, intended his model of the pure credit economy to supplement rather than replace such an approach. I shall then suggest that Woodford's treatment is disconcerting, because monetary economies still pose more problems than can be analyzed by the class of models that he elaborates. I shall illustrate this conclusion by drawing attention to the difficulties that these models encounter when they are applied to certain international monetary issues and also to the so-called "zero lower bound" problem that sometimes arises in depressed economies.

The "Pure Credit Economy" Model in Woodford and Wicksell

The traditional neoclassical theory of monetary policy derived from an intellectual framework which had something to say about the roles that money plays as a means of payment, medium of exchange, unit of account, standard of deferred payment, and store of value, about the influence of those factors on agents' demand for money, both as individuals and in the aggregate, about the institutional framework within which the supply of money is determined, and about how demand and supply interact to influence economic activity and prices.

Woodford self-consciously draws inspiration from Wicksell's model of a pure credit economy, whose creation was an important step forward in the development of that neoclassical framework, but he accords such an analytic system a very different status in the theory of monetary policy to the one that Wicksell intended for it in 1898. He treats its modern descendents as in and of themselves adequate to characterize the world we live in, and as providing a sufficient basis for analyzing monetary policy. Wicksell, on the other hand, treated the pure credit economy as an analytic fiction, intended to elucidate certain features of an altogether more complicated monetary environment as a step towards understanding it. To be sure, Wicksell discussed the pure credit economy in isolation, and in Chapter 9 of *Interest and Prices* he did so in terms of an explicit and carefully formulated (by the standards of 1898) economic model. Thus, deliberately or not, he invited successors to detach this aspect of his work from its overall context so as to develop in it isolation, and some of them did so. But much of the subsequent literature that Wicksell inspired, including Woodford's contribution, seems to me to accord rather more generality to the properties of the pure credit economy than they can really bear.

Wicksell's Chapter 9 sets out a model in which there is essentially a single good, whose production over a uniform period is financed by bank loans made for just that period. These assumptions make the determination of the natural rate of interest a matter solely for the real side of the economy, a highly misleading conclusion in almost any more complicated case, and they reduce the demand for money to what is required by a simple "bank deposits in advance" system with an income velocity of one, while simultaneously rendering its supply quite passive. It is also important to recall that Wicksell, in what must surely rank as one of the more significant Homeric nods in the history of economic thought, usually treated currency alone as money, not just as a matter of semantics but of substance too. His analytic simplifications, along with his

over-narrow concept of money, led him to suggest that the quantity theory was inapplicable to a world where exchange was mediated solely by commercial bank liabilities, and there have been many, including Woodford, who have followed him in this.²

This is not the place to do more than note that largely un-discussed problems with capital theory still plague much modern macroeconomics, including the real business cycle models that seem to underpin much modern analysis of the determination of the natural rate of interest that two-interest-rate systems like Woodford's bring into play along-side a policy-determined market rate, (though he himself largely makes do with models without capital, relying on a rate of time preference to motivate the sensitivity of aggregate demand to the market rate).³ But the problems that arise from the fact that, in the real world, chequable bank deposits are indeed money, and are generated as a byproduct of the continuous creation of and extinction of bank loans, which are not, however, matched to any unique period of production, are more central to the matters under discussion here. Other exponents of two interest rate models, both before and after Wicksell - Henry Thornton, Irving Fisher, Ralph Hawtrey, Gustav Cassel, to name only the most outstanding - all showed that, in these circumstances, the interaction of the supply and demand for deposit-money along quantity theoretic lines, can continue to play a key role in the transmission of monetary impulses.⁴

In short, even Wicksell's pure credit economy is not a moneyless economy, and that is probably why, even in those real world economies that most closely resemble it, monetary aggregates, particularly narrowly defined monetary aggregates, continue to be systematically leading indicators of the behaviour of output, and hence of inflation, under regimes in which policy is conducted by the manipulation of interest rates, and in which, when viewed through the prism of Woodford's analysis, the supply of money should be responding passively to, and hence lagging or at best fluctuating simultaneously with, just those variables.⁵ Even if demand for money relationships are not stable enough nowadays to provide a fulcrum for the conduct of policy, that does not mean that the interaction of the demand and supply of money does not lie at the heart of the policy transmission mechanism.

²In this respect, Woodford writes in tradition of those Swedish economists who, like Bertil Ohlin (1936) saw Wicksell as having liberated monetary economics from "the tyranny of the quantity of money". As I have argued in Laidler (1999a, Ch. 3) the Stockholm School's attempts to escape were less successful than they perhaps thought. Woodford does find a minor role for the quantity of money in some versions of his general system, as a passively determined variable whose quantity can nevertheless exercise an apparently trivial "real balance effect" on expenditure.

³The Stockholm School, however, being students of Cassel and Fisher, as well as Wicksell, were acutely aware of this issue. See Laidler (1999a, Ch. 3).

⁴On this matter see Laidler (1999b) and Humphrey, (2003).

⁵To use the vocabulary still popular at the Bank of Canada, monetary aggregates seem to remain active variables in the transmission mechanism, despite being determined endogenously to the system. For a recent discussion of this, see Longworth (2003).

This, however, is only the beginning of the matter, not its end, because, as Patinkin (1965) long ago pointed out, Wicksell's "pure credit economy" was never intended to tell the whole story about the monetary system that he was trying to understand, but only to elucidate the role of deposit banking therein as one component of an altogether richer story. His broader analysis was certainly marred by his failure to realize that the demand for bank deposits was amenable to the same careful analysis of transactions and precautionary motives that he deployed when dealing with the "pure cash economy", but it was not completely undermined.

International Monetary Considerations

Wicksell's central problem was international monetary stability. His *Interest and Prices* appeared at the very end of what at one time was known as "the Great Depression". That slow and steady deflation affected gold standard countries from the mid-1870s till the late 1890s and gave rise to the bimetallic controversy. It also prompted some economists to begin to think outside of the boundaries laid down by the already existing international monetary system, and to speculate about how economic analysis might be used to design something better. As Wicksell saw it, the lessons drawn from his model of the pure credit economy had to be fitted into an altogether broader analytic framework so as to move beyond the simple application of the quantity theory to the behaviour of the stocks of gold, and/or of silver, and towards a deeper and more relevant analysis of a multi-country monetary system in which commercial and central banks were playing an increasingly important role.

His work led him to conclude that no single country could go it alone under the gold standard or international bimetallicism, that international co-operation was essential to the creation of monetary stability, and that, given the crucial role of the market rate of interest in the process, it would be possible to get rid of the precious metals altogether and put the world on an international paper standard where the value of money would be regulated by central banks acting in concert. All this is a far cry from the "as if" closed economy model on which Woodford's theory of monetary policy is based.⁶

Woodford notes that his theory of monetary policy might usefully be applied to economies such as Australia, Canada or New Zealand. That is fair enough, but surely his "as-if" closed economy model works for these countries because their currencies play essentially no role in the international economy, are traded at market determined prices in well-developed foreign exchange markets and are used in rather complete sets of domestic financial markets. Woodford's analytic framework is too narrow to accommodate these preconditions explicitly, and he does not discuss them.⁷

⁶Though there is some precedent for the application of Wicksellian theory to the conduct of monetary policy in a single country, because his "policy norm" of raising (lowering) interest rates whenever prices rose (fell) was eventually to be implemented by Sweden acting in isolation at a time when the international monetary system had already collapsed. See Jonung (1979) for an account of this episode.

⁷Though readers in such countries will have to take it for granted their flexible exchange rate regimes render them "as if closed", a postulate that is by no means uncontroversial. Thus *Interest and Prices* cannot be used to teach

More importantly, perhaps, he also (more or less) takes for granted the applicability of his theory to the United States policy scene, but the above preconditions do not hold in this case, and so the approach leads him to overlook some important issues. The US is, of course, a very large and relatively closed economy, and to the extent that the Fed is concerned solely with domestic goals, it can as a matter of fact conduct policy aimed at them without having to worry about the behaviour of the exchange rate, or indeed about the fact that its measures often have international repercussions. In recent years, moreover, various US authorities have made it absolutely clear that they will in no way allow the interests of other countries that have adopted the US dollar as their currency, or pegged their exchange rates to it, to impinge upon Federal Reserve policy. To this extent, an “as if” closed economy model is adequate for the design of US policy, then, but that does not make it adequate for use by those who are concerned to understand its full consequences, for the simple reason that this policy does affect other countries, whether the US authorities care about this or not.

The US dollar’s role as an international means of payment, medium of exchange, unit of account, standard of deferred payment, and store of value, ensures that this is so. Anyone seeking to understand the workings of the world’s monetary system in the present era (as Wicksell was in his) cannot ignore the international repercussions of US policy, and, just like Wicksell when he came to deal with international issues, they will need to ground their efforts in a theoretical framework that goes well beyond any “pure credit economy” system. The problems of concern here are not confined to those countries that have pegged to the US dollar, or adopted it outright. Many countries outside of this group trade in international markets where the US dollar is used as a means of exchange and unit of account, and many also lack well-developed domestic financial markets in which even medium, let alone long, term bonds denominated in domestic currency can be traded, and for them, the US dollar is also an important standard of deferred payment. Such economies are going to be affected by US policy, regardless of their formal exchange rate arrangements, and their room for domestic monetary manoeuvre is, by implication, limited. Any remotely complete analysis of US monetary policy needs to be based on a theoretical framework that permits these questions to be addressed.

Nor should it be taken for granted that it is always safe for US authorities to ignore the overseas repercussions of their policies when they design them, even when they are concerned only with their domestic effects. Seigniorage is, to be sure, a close to trivial source of revenue at present in the advanced economies which Woodford’s system is expected to fit best, but this is not always and everywhere the case. The government budget constraint can still sometimes play a role in their broader monetary policy picture, and Woodford pays only a little attention to this matter.⁸

monetary policy course in such countries without some supplementary readings on the workings of flexible exchange rate regimes.

⁸Woodford does not ignore fiscal policy, and indeed makes it clear that his model implies the desirability that it remain restrained. But he mainly deals with fiscal policy as a factor that can shift the IS curve when it is not “Ricardian”, and does not emphasize seigniorage as a source of revenue and the fundamental interdependence of monetary and fiscal policy that stem from this. It does not seem to have crossed Wicksell’s mind that the

For example, from the mid-1960s onwards, US fiscal deficits, fuelled by a combination of expansionary domestic fiscal policies and the costs of a colonial war, were monetised throughout the Bretton Woods system. They set in motion the great inflation of the 1960s and 1970s, but its early onset in the US itself looked like a cost-push phenomenon coming from the outside, because some of the pressure seemed to be originating in international commodity markets that traded in dollars, not least that for oil. The US policy response to inflation in the 1970s was confused and inept, partly as a result of this misdiagnosis. It is worth worrying about whether something similar is beginning to happen now, but a theory of monetary policy that ignores the revenue generating capacity of money creation, treats the US “as if” a closed economy, and ignores the international monetary consequences of its domestic fiscal policy makes this a hard question to ask, let alone to answer.

The “Zero Lower Bound” Problem

If international monetary considerations, which were at the very heart of Wicksell’s concerns, are neglected in modern theories of monetary policy, it was Wicksell who neglected another issue inherent in the two-interest-rate approach to monetary policy which has attracted much of attention recently. I refer to the so-called “zero-lower bound” problem, which arises when, despite the best efforts of policy makers, the economy falls into stagnation, deflation rears its head, and the nominal interest rates under central bank control reach their lower limit. The US in the early 1930s and Japan from the early 1990s onwards are prime examples of the phenomenon, though it also threatened for a while to put in an appearance in the US at the turn of the millenium.⁹

It is always dangerous to speculate about why an economist didn’t deal with a particular problem that, with hindsight, seems to be important and relevant to his work, but at least three factors might have played a role in Wicksell’s neglect of the zero lower bound question. First, though his theory of money was thoroughly articulated (if defective in its treatment of deposit money), his actual analysis of a monetary policy regime based on the manipulation of interest rates was nevertheless rather sketchy; second, his concern was with the influence of the monetary system on the longer run behaviour of the price level in the international economy, not within the cycle in a particular country; and third, he was writing in the wake of two decades of deflation, which, though it had generated distress in some sectors of some economies - for example agriculture in the US, or export industries competing with silver standard countries in the UK - had not been associated with anything resembling general stagnation.

abandonment of specie convertibility as a basis for the international monetary system while maintaining fixed exchange rates, measures that he proposed in 1898, might tempt governments to use that system as a source of seigniorage, but nowadays we know better.

⁹The following few paragraphs draw on a recent critique of Svensson’s paper (Laidler 2004) which is, in some respects a companion piece to this one.

But now, after the US experience of 1930s, and that of Japan in the 1990s, and with two or three generations of economists having been exposed as undergraduates to analytic exercises centered on the role of the liquidity trap in the IS-LM model, it is hardly surprising that the zero lower bound issue is highly visible. In this context, however, our prevailing theory of monetary policy's focus on interest rates, and its neglect of broader questions having to do with the supply and demand for money has some odd consequences. When exponents of that theory, Woodford, but also and at greater length Svensson (2003), have discussed the monetary problems facing Japan in the 1990s, they have diagnosed a liquidity trap, and prescribed as a cure some measure or other designed to induce expectations of inflation that will turn a close to zero nominal interest rate into a real rate sufficiently low, even negative, to get things moving again.

Though, as a practical matter, inducing changes in inflation expectations by policy announcements as opposed to actual experience is always a difficult matter, there is nothing theoretically wrong with the latter proposals. Indeed, Sir John Hicks (1983, Ch. 5) once suggested that an essentially similar mechanism for helping to bring about recovery from a cyclical slump was inherent in 19th century specie standards, to the extent that the preceding downturn had driven the price level to a value below its long run equilibrium value as determined by the supply and demand for the precious metals. Even so, because of their diagnosis of a liquidity trap, the exponents of modern theories of monetary policy have also cast doubt upon the likely efficacy of a simple process of vigorously increasing the Japanese money supply, and here they have been on weaker ground, for a number of reasons.

To begin with, a "liquidity trap" is a state of affairs in which the demand for money becomes perfectly elastic with respect to a long rate of interest at some low positive level of the latter. Until the policy of "quantitative easing" was begun in 2001, the ratio of the Japanese money stock to national income, whether money was measured by the base, M1, or any broader aggregate, rose slowly at best, and it was short, not long, rates of interest that were essentially zero. Given these facts, it is hard to see what the empirical basis for the diagnosis of a liquidity trap could have been. On the other hand, and again before 2001, the empirical evidence gave no reason to reject the hypothesis that a quite separate and distinct phenomenon was at work, namely a Hawtreyan "credit deadlock". Here the problem is not a high elasticity of the economy's demand for money with respect to the long rate of interest, but a low elasticity of its demand for bank credit with respect to the short rate, which inhibits the borrowing that is a necessary prerequisite for money creation. The solution to a credit deadlock, as Hawtrey pointed out, is vigorous open market operations to bring about increases in the monetary base, and therefore the supply of chequable deposits, that mere manipulation of short term interest rates is usually sufficient to accomplish in less depressed times.¹⁰

Now the conditions for a liquidity trap might indeed have existed in Japan in the 1990s. Until the credit deadlock affecting its monetary system was broken by quantitative easing in 2001, which produced increases of roughly sixty percent in the ratios of the base and M1 to

¹⁰See Laidler (1999, Ch.5) for a discussions of Hawtrey's views on the cycle, and Ch. 10 for Keynes on the liquidity trap.

national income over the following year, it was impossible to know this. As it has happened, however, the subsequent vigorous up-turn of the Japanese economy that began in 2002 and is still proceeding is beginning to suggest that there was no liquidity trap at work in that economy. If further evidence bears out this conclusion, a serious policy error was made in the 1990s, and that error was based on a theory of monetary policy that treats the short interest rate as the central bank's only tool, and characterizes the transmission mechanism as working solely through the influence of interest rates on aggregate demand.

That theory provided no means for Japanese policy makers to distinguish between a liquidity trap, which is a possible feature of the demand for money function, and a credit deadlock which is a characteristic of the money supply process, or for them to entertain the possibility that variations in the money supply might affect aggregate demand by channels over and above any effect on market rates of interest. It was therefore a dangerously defective guide to the conduct of monetary policy in Japan, as it is in any depressed economy. But it is precisely such a theory of monetary policy that lies at the heart of Woodford's book.

Concluding Comment

In short, my verdict on the theory of monetary policy that Woodford has so elegantly and thoroughly elaborated in his *Interest and Prices* is that it is well adapted to teaching us how to sail in already calm monetary conditions, in fair fiscal weather and in the confined waters of a closed economy. It teaches us how to stay on a course defined by low and stable inflation in such an environment, and therefore is going to be of great value to the practitioners of monetary policy in a few select economies where inflation is already behaving itself and monetary stability is not threatened by fiscal policy or foreign disturbances.

The theory in question also has distinguished antecedents, being in the tradition of Chapter 9 of Wicksell's *Interest and Prices*. But for Wicksell, the pure credit economy was an analytic fiction meant to elucidate aspects of an altogether broader and more complicated framework, not an abstract version of a complete monetary system. His "systematic exposition of the theory" in Chapter 9 was a means of conveying detailed information about a limited number of problems, such as a novice sailor might encounter in sailing from one side to the other of a rather sheltered pond, because he thought that this knowledge would also be necessary for anyone navigating in the open sea of the late 19th century international monetary system. But we forget at our own peril that Wicksell did not think it sufficient in and of itself to prepare anyone for this much more difficult task.

Writing at the end of the 19th century, Wicksell could hardly foresee the kind of storms that would soon break over the monetary system, but the neoclassical theory of money in which his theory of monetary policy was embedded did ultimately prove amenable to the modifications necessary to cope with them. His model of the pure credit economy is altogether narrower than that theory of money, however, and it is not a sufficient foundation for a theory of monetary policy. So long as economists treat Woodford's theory of monetary policy as a framework that elaborates and codifies the models that central bankers in certain advanced economies often use

these days in thinking about how to keep domestic inflation under control, it will be a contribution of enormous positive value. If they allow the elegance and rigour of his exposition to distract their attention from the narrow scope of his theory, and under its influence begin to lose sight of the neoclassical theory of money that their predecessors, including Wicksell, created, and of the broader set of issues with which monetary policy sometimes has to deal, Woodford's work will be a source of trouble.

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