The new macroeconomics has no clothes

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Introduction

The fundamental flaw in the new macroeconomics is that it cannot integrate monetary and financial institutions and markets with the markets and institutions for goods and services. For similar reasons it is also incapable of assessing the role of government, fiscal policy and correctly assessing the size of fiscal or other multipliers. It is therefore incapable of shedding any light on fiscal or monetary policy and the role of governments and central banks. It is not surprising that Krugman (2009) thinks macroeconomics has returned to the dark ages.

The reason for this state of affairs is that all forms of the new macroeconomics have at their core a *standard model* that precludes any role for money, central banks and government. The standard model is a form of Walrasian or Arrow-Debreu general equilibrium theory that reduces any economy to four elements: tastes (utility functions) technology (production functions), endowments (commodities and factors of production) and *an assumption that competitive inter-temporal markets composed of these three elements will produce an equilibrium solution*. These are the microeconomic foundations for the new macroeconomics that cause all the trouble.[1]

In particular, the formal treatment of the notion of competitive inter-temporal equilibrium is the Walrasian re-contracting or *time-0 auction*. Only equilibrium trades are allowed under this auction and *it allows for the trade of all endowments across time and space without the need for money or credit*. In other words the standard model is a model of *perfect barter*.[2] The standard model therefore has no need for institutions such as money, banks, central banks or government.

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[1] It is also doubtful that these "microfoundations" have a superstructure that could be described as macroeconomics even on their own terms. See Kirman (1989). They certainly have nothing in common with the Marshallian microeconomic foundations to Keynes's macroeconomics.

[2] This conclusion is not changed by the inclusion of "production" because "production" is simply treated as a form of exchange - endowments of factors of production are simply transformed into endowments of commodities under the specified technology.

In fact it has long been known, Hahn (1965, 1982) that the time-0 auction is an analytical substitute for money. There is no money in Arrow and Debreu (1954) or Debreu (1959) because none is required. Unfortunately that has not stopped theorists from allowing common sense to break in and induce them to add money to an 'economy' where it is not required. Alternatively, theorists resort to changing the meaning of words.

If this sounds philosophical or metaphysical that's because it is. The new macroeconomics has blundered through the Looking Glass with Alice and seeks to emulate the White Queen by believing six impossible things before breakfast.[3] For example, in two well-know cases to be discussed more fully below, Woodford (2003) and Cochrane (2005) ask us to believe that it is possible for a central bank to determine nominal interest rates and the price level *in a model that contains no money*. New Monetarists like Williamson (2012, 2013, 2014) essentially ask us to do the same. The White Queen would be impressed; theorists should not be so gullible.

To make this clear I first outline the properties of the standard model on which all versions of the new macroeconomics rest. I then illustrate examples of the conceptual and logical muddles that arise in the new macroeconomics as a consequence of incorporating institutions into the standard model when they are not required. Yet exponents of the new macroeconomics feel compelled to introduce these institutions if they are to be relevant. But when they do so their models are inevitably reduced to 'non-sense'.

The standard model

The standard model is some form of a 'well-specified Walrasian general equilibrium model', its modern version the Arrow-Debreu model or its 'dynamic' version the real business cycle model. The real business cycle model is simply a well-specified Walrasian general equilibrium system that has been subjected to exogenous serially correlated and suitably 'calibrated' technology shocks.

As far as the monetary and financial sectors are concerned, it was pointed out long ago by Hahn (1965, 1982) and restated by Laidler (1988), Hoover (1988) and Rogers (1989) that this standard model is essentially one of *perfect barter*. It is a model of perfect barter because it rests on the time-0 auction that renders it possible to trade all goods and services across time and space *directly without the intervention of money or credit*. As Hahn (1982, p.1, emphasis added) put it:

" The most serious challenge that the existence of money poses to the theorist is this: *the best developed model of the economy cannot find room for it. The best-developed model is, of course, the Arrow-Debreu version of a Walrasian general equilibrium*. A world in which all conceivable contingent future contracts are possible neither needs nor wants intrinsically worthless money."

This time-0 auction underpins any well-specified, Walrasian or Arrow-Debreu model and it has been misapplied to recursive or dynamic macroeconomics. In

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[3] Brian Loasby (1976, p. 27) drew attention to this problem long ago.

that respect Ljungqvist and Sargent (2004, p. 217) illustrate how the notion of competitive equilibrium is conflated with the time-0 auction:

"In *the competitive equilibrium* all trades occur at $t = 0$ in one market. Deliveries occur after $t = 0$, but no more trades. A vast clearing or credit system operates at $t = 0$."

From that perspective, the real business cycle model is "real" because it has no need for money as it also rests on a time-0 auction so is best understood as a *perfect barter model of the business cycle*. The so-called dynamic stochastic general equilibrium models, for example Smets and Wouters (2007), should be similarly re-named as they all have a "real" business cycle model at their core to which various epicycles have been appended.

As Laidler (1988) stressed, the time-0 auction is an *analytical substitute* for the functions of money and credit but *a necessary* assumption for construction of the model. To be clear on this point: without the time-0 auction, or something equivalent, the standard model becomes intractable –hence the reluctance of its users to give it up. But retaining the time-0 auction under the guise of *competitive equilibrium* means that the standard model has *no need for money or monetary theory*. The importance of this time-0 auction is overlooked because it is conflated with the notion of inter-temporal competitive equilibrium –as illustrated above by Ljungqvist and Sargent. But competition, even perfect competition, does not imply a time-0 auction. The time-0 auction is simply an imaginary construct that is *inconsistent with monetary theory and macroeconomics*.

The relevance of this point was illuminatingly, if unintentionally, fully exposed by Neil Wallace's (2004) attempt to model *central bank interest rate control in a cashless Arrow-Debreu economy*! Any Walrasian general equilibrium theorist should have realised that this was an impossible task. Not only is no central bank or money required in the Arrow-Debreu model but obviously, inserting a monopolist, a price-setting central bank, into a model that supposedly proves the existence of a competitive equilibrium, is an oxymoron. Yet variations of this conceptual mistake are the *leitmotif* of the new macroeconomics.

Apart from its inability to deal with money, credit, financial markets and monetary policy, the time-0 auction and perfect barter property of the standard model is also largely responsible for the confusion about fiscal policy and the size of multipliers. A telling example is Woodford (2011) who proposes to outline the simple analytics of the government *expenditure* "multiplier" in classical and new Keynesian versions of an Arrow-Debreu-type world. This case is discussed more fully below but it should be obvious that Walrasian/Arrow-Debreu general equilibrium has no role for an aggregate consumption function so Kahn-Keynes multipliers are not defined in these models. There are also *no unemployed resources* or output gaps, only *inefficiently allocated* resources, in well-specified Walrasian-Arrow-Debreu models. There are no holes in Euclidean space.

Resources (endowments) may be inefficiently allocated if the time-0 auction is made to malfunction in some way, for example, as in the fix-price models of the Clower (1967), Barro-Grossman (1976) type or the more recent new Keynesian

models of imperfect competition in commodity markets. Such fix-price equilibria remain moneyless equilibria that are Pareto inefficient. Reinstating the full time-0 auction would restore the efficient allocation. But in that case the only useful role of government is to repair the malfunctioning time-0 auction and restore the efficient allocation of resources. Structural adjustment policies intended to make prices and wages more 'flexible' are policies of this type.[4]

Examples of the logical and conceptual flaws in the new macroeconomics

There are three schools that dominate the new macroeconomics; new classical, new Keynesian and monetarist, and all employ the standard model: microeconomic foundations that involve forms of the Walrasian general equilibrium theory, its Arrow-Debreu version or the real business cycle model. Consequently they have no need for money, financial markets, central banks or governments. The time-0 auction that underpins the model is an analytical substitute for these institutions so they are not required. Governments and central banks actually exist because the time-0 auction cannot. If it did or could exist we would live in the world of Dr Pangloss, or perhaps the Borg.

Nevertheless, many theorists cannot help common sense breaking in so they seek to add these institutions to the standard model with fatal consequences for their logic and conceptual coherence. For an approach to *economic* theory based on the axiomatic approach this flaw is, or should be, fatal.

Hard-core real business cycle theorists, of course, do not succumb to this temptation but then they have nothing to say about money, credit or finance.[5] Today the real business cycle model nevertheless acts as the microeconomic foundation for those who seek to incorporate money, credit and finance into the standard model.

The following examples illustrate these properties in the various versions of the new macroeconomics.

Money and finance in new Classical models

The task of introducing money and finance into new classical models has been approached in two ways: traditionally by imposing a cash-in-advance constraint as proposed by Clower (1967) or Lucas (1984) but more recently in attempts to introduce financial markets by changing the meaning of words. Cochrane (2005) is an example of the former while Brunnermeier and Sannikov (2014) is an example of the latter.

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[4] In this context 'flexible' means to replicate the time-0 auction, an impossible task.

[5] Nevertheless, McCandless (2008, p. 184) provides a revealing example for those who seek to add a cash-in-advance constraint to a real business cycle model by pointing out that *money is converted from a lubricant to a friction* in such a model. Not surprisingly, the same result occurs in any new Keynesian model that employs a "real" (perfect barter) business cycle core, Rogers (2013, 2014).

Cochrane's well-specified Walrasian general equilibrium model of the price level; the macro-finance cannon

In a paper titled *Money as Stock* Cochrane (2005) sets out to offer a defence of the 'fiscal theory' of the price level and claims to show that the price level can be determined in a well-specified Walrasian general equilibrium model even when it is in a 'cashless', i.e., moneyless state. To support his argument he also claims that any quantity of assets, even Microsoft stock (shares), can take the place of money in a 'cashless' economy so government bonds could replace the quantity of money in determining the price level.

Traditionally, in Walrasian general equilibrium theory, adding a quantity equation to the set of real (perfect barter) equations was the method for introducing the redundant concept of the price level. But apart from the confusions into which that approach led Patinkin (1965) and Clower (1967, 1984),[6] recognition that in contemporary monetary systems money is supplied endogenously by central banks led to the view that the quantity equation and monetary aggregates were no longer relevant.

So to avoid any mention of money aggregates Cochrane proposes that the quantity of public debt can serve the same function as the quantity of money and render the price level determinate in a 'cashless' well-specified Walrasian general equilibrium model. But this is 'non-sense' because Cochrane overlooks entirely two well-known properties of a well- specified Walrasian general equilibrium model.

First, all endowments or assets are equally liquid in a Walrasian general equilibrium model.[7] This follows from the time-0 auction necessary to solve the model. Under the time-0 auction all endowments can be traded directly without the intervention of money and credit; Cochrane's 'well-specified Walrasian general equilibrium system' is therefore one of *perfect barter* that has no need for money.[8]

Second, the price level is a concept of relevance in a monetary economy where participants are concerned about the purchasing power of their money balances. As Cochrane's well-specified Walrasian general equilibrium model is a model of *perfect barter* then *ipso facto* there is no need for the price level and no need for a theory of the price level, be it fiscal or otherwise. As Rogers (2007) explains in greater detail, Cochrane (2005) is simply repeating Wallace's (2004) mistake.

By allowing common sense to motivate the need for an asset to determine the price level in a model where the concept of the price level is not required, Cochrane reduces his defence of the fiscal theory of the price level to 'non-sense'.

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[6] Patinkin sought to give money utility when under a time-0 auction it has no utility while Clower is the source of the mistake (the cash-in-advance constraint) that converts money from a lubricant to a friction in the new macroeconomics.
[7] Lucas (1984) pointed out that all endowments are equally liquid. They are all equally liquid because they are traded under the time-0 auction.
[8] This is Hahn's (1965) point.

There may, of course, be a more sensible defence of such a theory outside of a well-specified Walrasian general equilibrium model.

Similar conclusions apply to attempts to incorporate something called 'a government' into a well-specified Walrasian general equilibrium model. Following Wallace, consider the role of government in a cashless Arrow-Debreu economy or well-specified Walrasian general equilibrium model. In a world of perfect barter under a time-0 auction, what exactly, is government to do? Why is spending and taxing required? What would government bonds be in such a model? There are no coherent answers to these questions.

For example, under a Walrasian or time-0 auction there is nothing for government to do unless the auctioneer has become impaired and the time-0 auction is malfunctioning. In that case the government's role is clear: restore the auctioneer to good working order. Government taxing and spending could then consist of repairing the malfunctions in the auction by requisitioning (taxing) misallocated goods and services and re-allocating (spending) or transferring them to replicate the Pareto-efficient allocation that would have been generated under the un-impaired time-0 auction. A simple case would be to imagine how a 'government' would correct the misallocation of resources that occurs in a fix-price model of the Barro-Grossman (1976) type.

Based on what we have said above, 'fiscal policy' in a well-specified Walrasian or Arrow-Debreu model can only refer to the role of 'government' in repairing a malfunctioning time-0 auction. In the standard model, resources may be inefficiently allocated if the time-0 auction malfunctions but they are never unemployed. [9] In such a model, governments simply redistribute they do not create; they do not increase the trading and production possibilities and the stabilising properties of fiscal policy from old macroeconomics are not required as no resources are ever involuntarily left idle. Involuntary employment is defined away and public goods are excluded by construction in the new macroeconomics.

Alternatively, 'government' if it resorts to forms of requisition other than lump-sum taxes, may introduce inefficient allocations by interfering with the real exchange ratios generated by the time-0 auction. In other words, government, or other 'frictions' may inject 'inefficiency wedges' by distorting the perfect barter commodity exchange ratios generated by the time-0 auction. The welfare improving solution is therefore obvious – remove the government-imposed 'inefficiency wedges' or other 'frictions' by suitable structural reforms. That is the extent of what well-specified Walrasian general equilibrium models have to say about 'fiscal policy'. It should therefore come as no surprise that Kahn-Keynes type fiscal policy multipliers appear to be near zero in models that use the standard model as their core.

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[9] The concept of involuntary unemployment of capital and labour is not defined in Walrasian-Arrow-Debreu general equilibrium as Patinkin (1965, chapter 13) inadvertently revealed and Lucas (1984) stressed.

Brunnermeier and Sannikov's attempt to incorporate a financial sector into a macroeconomic model

Unlike Cochrane, Brunnermeier and Sannikov (2014) are not concerned with theories of the price level and fiscal policy but rather with the need to incorporate financial markets into a real business cycle model (which they equate with macroeconomics).

Recall that Buiter (2009) charged that the 'complete markets' new classical and new Keynesian models did not allow questions about insolvency and illiquidity to be answered, they did not even allow them to be asked! Clearly real business cycle models are open to Buiter's criticism but they don't pretend to have answers to those questions. Brunnermeier and Sannikov (2014) propose to fill that gap by incorporating financial markets into a real business cycle model. As we may by now anticipate this does not end well. Allowing common sense to dictate that financial markets and liquidity should be introduced in a model where they are not required inevitably leads to more 'non-sense'.   In this case words take on different meanings.

This is most evident with the Brunnermeier and Sannikov treatment of liquidity. As any monetary theorist knows, liquidity is defined as the ability to convert any asset into money at short notice with minimum loss. But as there is no money in a real business cycle model this is not the concept of liquidity employed by Brunnermeier and Sannikov.

Instead of the conversion of any asset into money Brunnermeier and Sannikov (2014, p. 386) simply assume the existence of a 'fully liquid' market in which *physical capital* is traded between households and firms. Now this is obviously a false statement about the economy in which we live (no such market exists) *but it is a property of the perfect barter (real) business cycle model* in which all endowments are perfectly liquid in the sense that they can always be exchanged directly across time and space for any other commodity, without the need for money or credit, under the time-0 auction. (Recall Lucas (1984).

The model is therefore intended to be metaphor for the role of the stock and other capital markets that do exist.   But this is a false metaphor because the time-0 auction is not a model of any stock or financial market that exists on planet earth. So the concept of liquidity as employed by Brunnermeier and Sannikov (2014) is not the concept of liquidity relevant to the understanding of financial crises. [10] In other words, the Brunnermeier and Sannikov proposal to

[10] Nor is the definition of liquidity used by Allen and Gale (2007, Chapter 3: 59) who define liquidity as follows: "*The liquid asset (also called the short asset) is a constant returns to scale technology that takes one unit of a good at date t and converts it into one unit of the good at a date t+1, where t = 0, 1*". Clearly this is

integrate the concept of liquidity and financial markets into a real business cycle model falls to Buiter's (2009) broadside.

This becomes even more evident when Brunnermeier and Sannikov (2014, p. 384, emphasis added) state:

" In an economy *without financial frictions and with complete markets,* the flow of *funds* to the most productive agents is unconstrained, and, hence, the distribution of wealth [endowments] is irrelevant*. With frictions, the wealth distribution may* change with macro shocks and affect aggregate productivity. When the net worth of productive agents becomes depressed*, the allocation of resources (such as capital) in the economy becomes less efficient,* and asset prices may decline."

From this description we are told that in a world without financial 'frictions' there is no constraint on the flow of 'funds' to the most productive agents. But as pointed out above, there are no 'funds' in the complete markets model. In the Brunnermeier and Sannikov 'economy without financial frictions' all endowments are equally liquid so no 'funds' are required. Hence, in the Brunnermeier and Sannikov 'economy', 'funds' are not finance or money but any endowment, be it jam or a Porsche! There are no 'funds' in the model as the term is commonly understood. Brunnermeier and Sannikov are confusing 'funds' with the time-0 auction and changing the meaning of the word 'funds'. As with the case of Allen and Gale (2007), we seem to have encountered Humpty-Dumpty's claim that words can mean what we want them to mean.

In similar vein, what are the financial frictions to which Brunnermeier and Sannikov are referring? In the world in which we live there are indeed many financial frictions – incomplete and asymmetrical information, nominal contracts fixed for a period of time and so on. But such frictions do not exist in a well-specified Walrasian/Arrow-Debreu model, or its real business cycle version, under a time-0 auction. Frictions occur in the model only when the time-0 auction is made to malfunction by the theorist.

Recall that the fix-price models of the Barro-Grossman type prevented the time-0 auction from finding the equilibrium trades so had to be augmented by rationing rules - for example, the short side of the trade dominates. What the model then produces is a Pareto inefficient re-allocation of endowments. The 'financial frictions' introduced by Brunnermeier and Sannikov perform essentially the same function – they impair the ability of the auctioneer to find the equilibrium trades and produce *inefficient outcomes* as Brunnermeier and Sannikov describe.

Ultimately, Brunnermeier and Sannikov produce the counterintuitive conclusion that their 'economy' is less efficient with a financial sector than it is without one – the financial sector imports 'frictions' into an otherwise efficient allocation

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nothing more than an implication of the time-0 auction and makes Buiter's point. Perhaps the title of the book should be changed to *Misunderstanding* Financial Crises?

model. Adam Smith would not be impressed. Like Woodford and Cochrane who convert money from a lubricant to a friction Brunnermeier and Sannikov convert finance from a lubricant to a friction. That begs the obvious question: why does the financial sector exist? Why doesn't the world revert to perfect barter as in the real business cycle model?   The answer is obvious but seems to have escaped exponents of these models.

Money, Finance and multipliers in New Keynesian models

As I have elaborated on monetary aspects of New Keynesian models in considerable detail elsewhere Rogers (2006, 2011, 2013) I can be brief. Essentially the points I made were concisely described recently by Borio and Disyatat (2011, Appendix A, p. 31, emphasis added) who correctly describe the properties of that theory as follows:

"*The canonical model is that of a money-less economy that can do away with the ultimate settlement medium (Woodford's (2003) "cashless economy"). Indeed, **paradoxically**, **when settlement balances (money) are introduced, they act as a "friction", not as the indispensable lubricant** in an otherwise inefficient barter-exchange mechanism. It is an economy in which credit is just a vague shadow in the background: since credit does not affect behaviour, its evolution does not need to be tracked. When banks are introduced, credit may have more information content. But, even then, intermediaries do not generate purchasing power, **they simply transfer real resources from one sector to the other**. The underlying economy is, in this sense, **a real economy disguised as a monetary one**. **Credit is just another real resource** that households make available to entrepreneurs.*"

Here Borio and Disyatat clearly recognise the *perfect barter* properties of Woodford's model.[11] Woodford and followers like Gali (2008), use an 'economy with complete markets', a version of the standard model that is a synonym for the Walrasian or Arrow-Debreu model. Such a model has no role for money, credit or financial markets because it is a model of perfect barter.

Consequently, allowing common sense to dictate that money be introduced somewhere, because it actually exists in the economy in which we live, leads only to 'non-sense'. Both Woodford and Gali simply attach a quantity equation or what amounts to the same thing, a cash-in-advance constraint to an otherwise, complete markets economy –*aka* a well-specified Walrasian or Arrow-Debreu model. At the cashless (moneyless) limit, or when it is convenient, they drop the monetary equation, leaving the underlying model of perfect barter intact.[12] The approach is motivated by the belief that such a 'cashless' model approximates

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[11] *Mutatis mutandis* their comments apply equally well to all the models of the new macroeconomics.

[12] All inessential institutions added to models with a time-0 auction can be similarly removed without disturbing the existence of a perfect barter equilibrium. They are 'inessentail' additions in Hahn's (1973 a, b) sense. Gali (2008) provides an illuminating illustration of how new Keynesian frictions and distortions are nested around the perfect barter, moneyless, core.

the world of Wicksell's pure credit economy or the world of electronic money where monetary aggregates play no role.

But the time-0 auction necessary to render the model tractable is not the same thing as Wicksell's pure credit economy or the emergence of electronic money. Wicksell did not accept Walras's approach to general equilibrium, let alone its modern incarnations, and electronic money is not the same thing as a time-0 auction. No amount of computing power or any real time gross settlement system can replicate a time-0 auction. To conflate the two is a mistake. All monetary systems, including electronic monetary systems, require a means of final settlement –money! Over time the *form of money changes*, from gold to paper to plastic and today to electronic transfer, *but money does not disappear*! Finally, as Borio and Disyatat also note, the new Keynesians convert money (or finance) from a lubricant to a 'friction' –contrary 200 years of conventional wisdom and common sense. Effectively new Keynesians repeat Clower's (1967) conceptual mistake.[13]

In addition to these flaws new Keynesian monetary models are also riddled with examples of other muddles. Most notable is the confusion of the *numeraire* with money and *numeraire* prices with nominal prices.[14] But as all Walrasian general equilibrium theorists know, the *numeraire* can be anything, even something that doesn't exist. Mischievously Buiter (2002) suggested phlogiston, the mythical substance once thought to cause combustion. But if the *numeraire* need not exist, as Woodford agrees, then although *numeraire* prices can exist at Woodford's cashless limit, it is not possible for the central bank to trade in something that doesn't exist to control interest rates or inflation of *numeraire* prices. Woodford's (2003) foundations for a theory of monetary policy simply collapse into incoherence as outlined by Rogers (2006, 2011, 2013).

The picture is no better when we turn to new Keynesian analysis of fiscal multipliers. Woodford (2011) is a revealing example of how the standard model at the core of the new macroeconomics has distorted clear thinking.

To examine the *simple analytics* of government expenditure multipliers Woodford (2011) begins with a benchmark neoclassical model of competitive equilibrium that is a particular version of the standard model proposed by Barro and King (1984). In addition to tastes, endowments, technology *and the time-0 auction*, Woodford introduces another agent called 'government'. This agent simply consumes some of the output (Woodford, 2011. (1.3)) - acquired by imposing a lump-sum levy (tax) on other agents. Expression (1.3), reproduced below, looks exactly like the equilibrium condition for a simple old Keynesian income expenditure model.

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[13] Clower (1984) ultimately realised this mistake and gave up attempting to integrate money and Walrasian general equilibrium theory.
[14] At one point Buiter (2007) wondered if *numerairology* was the future of monetary theory!

$$Y_t = C_t + G_t \quad (1.3)$$

But instead of deriving a Kahn-Keynes multiplier by applying an aggregate consumption function Woodford subtracts government consumption from output in the utility function of the representative household (he assumes an infinite number of identical households) and then examines how total output changes when government consumption changes. He then treats this expression as the government *expenditure* "multiplier" which he writes as expression (1.7) below,

$$\frac{dY}{dG} = \frac{\eta_u}{\eta_u + \eta_v} \quad (1.7)$$

where $\eta_u > 0$ is said to be the negative of the marginal utility of consumption and $\eta_v > 0$ elasticity of the marginal product of labour in production. For comparison the old Keynesian multiplier corresponding to expression (1.3) is reproduced as (1.7')

$$\frac{dY}{dG} = \frac{1}{(1-c)} \quad (1.7')$$

where c is the marginal propensity consume derived from an aggregate consumption function.

The first point to note is that there is no *expenditure* in Woodford's model. The model is that of a *perfect barter world under a time-0 auction* so the variable G refers only to government consumption not expenditure.

Second it should now be clear that the "multiplier" in expression (1.7) has nothing in common with the Kahn-Keynes multiplier in (1.7'). The "multiplier" in expression (1.7) is derived from a model that rests on a *time-0 auction* and as such is entirely imaginary without any coherent empirical basis. The multiplier in expression (1.7') is based on the concept of an aggregate consumption function that has a long established empirical existence.[15]

In fact it is far from clear what the term "multiplier" means in Woodford's benchmark model. What expression (1.7) does describe is how output changes as a utility maximising, self-employed artisan changes consumption and work effort in response to an increase in government consumption. Hence only elasticities of consumption and "production" are included in the "multiplier". It is also far from clear why this 'inefficient allocation' concept is of interest to macroeconomists faced with output gaps and involuntary unemployment in a monetary economy.

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[15] In each case this conclusion is unaffected by increasing the complexity of the multipliers.

The above discussion of the new Keynesian analysis of "multipliers" provides a simple illustration of how concepts from old macroeconomics are redefined by the new macroeconomics even when the same words are used to describe them. Changing the meaning of concepts in this way is nevertheless an inevitable consequence of adopting the standard model.

Money and finance in new monetarist models

The new monetarists are represented by Williamson and Wright (2000) and propose to deal specifically with questions of liquidity, and financial crises as in Williamson (2012, 2013, 2014). In short they take up Buiter's challenge.

New monetarists are rightly critical of new Keynesian monetary theory on the grounds that the models employed have no 'essential' role for money in Hahn's (1965, 1973a, b) sense. They therefore seek to give money an essential role without the need to fall back on the old monetarist doctrine based on monetary aggregates. To this end they incorporate search theory and require that all participants use money to make purchases. In this way they allow money to act as a lubricant, rather than a friction, in the search process as monetary exchange dominates barter by avoiding the constraint imposed by the double coincidence of wants, for example.

Unfortunately search theory alone produces intractable indeterminacy. So to render their models tractable new monetarists restrict the search-theoretic component of their analysis to what they call *decentralised trading* and augment the model with what they call *centralised trading*. As they acknowledge, what they call centralised trading is simply a version of the Walrasian 'market'. New monetarist models therefore consist of two elements; a component with decentralised trading where money helps to improve trade outcomes and a Walarasian general equilibrium component where money has no role.

The difficulty with this strategy should now be obvious; the model includes elements where money is required or is 'essential' – the decentralised markets-with elements where it is not required – the centralised Walrasian 'market'. The two elements of the model are not compatible as is the case with all previous attempts to attach money, credit and finance to a Walrasian general equilibrium model. With the Walrasian 'market' comes the time-0 auction that converts all endowments into equally liquid goods that can be exchanged across time and space without the need for money or credit. In other words, the Walrasian element of the model is one of *perfect barter*.

Consequently, for the model as a whole, this strategy is equivalent to the imposition of a cash-in-advance constraint because although money may be a lubricant in the search process, search clearly leaves a residual inefficiency or friction that must be removed in the centralised Walrasian markets. But that again begs the question: Why do these decentralised markets exist if they are inefficient relative to the centralised 'market'? Why don't the efficient centralised Walrasian markets crowd out the inefficient money-using markets? Again common sense has prompted the import of concepts into a model where they are not required and therefore not defined, leading only to the by now familiar confusion.

For example, currency still exists in the Walrasian or centralised market element of Williamson's (2013, p.5) version of the model and trades at a 'price' in terms of goods. Clearly this is what new macroeconomists like Cochrane would call the price level. To compound the conceptual confusion a central bank also exists in the centralised Walrasian market and trades money for short and long-term government bonds. But like money there is no need for a central bank in a Walrasian component of the model based on a time-0 auction. What looks like an analytical short cut, the use of centralised trading, turns out to be the same *cul de sac* into which new classical and Keynesian theorists have blundered.

Consequently, like all other elements of the new macroeconomics, Williamson introduces institutions and concepts that actually exist into the Walrasian component of his model where those institutions and concepts have no role under the time-0 auction. He fails to notice this because he treats his assumption of a 'continuum of buyers and sellers' as a mathematical expression for perfect competition, which in turn he tacitly treats as the same thing as the time-0 auction.

But, as noted above, this is a false step. The assumption of perfect competition does not necessarily imply a time-0 auction. It certainly did not in Marshall. So Walrasian general equilibrium theory does not provide the relevant microeconomic foundations for the macroeconomics of Keynes or Friedman – both professed Marshallians.

But if microeconomic foundations are equated with the Walrasian/Arrow-Debreu model[16] then as I noted above they preclude any role for money, the price level and *ipso facto* any role for the central bank. So Cochrane, Brunnermier and Sannikov, Woodford and Williamson, are all reduced to story telling without any sound foundations in economic theory. That partly accounts for the unnecessary complexity of their analysis and no doubt explains the counter intuitive or contradictory conclusions that they inevitably reach.

Conclusion.

The new macroeconomics rests on microeconomic foundations that require a time-0 auction to determine equilibrium. But the *time-0 auction is a false model of competitive equilibrium* and acts as an analytical substitute for all the institutions and properties of interest to macroeconomists. It also means that the standard model that underpins the new macroeconomics is one of *perfect barter*.

Failure to realise this has meant that theorists have proceeded to incorporate institutions into 'economies' where such institutions are not required. The time-0 auction is an analytical substitute for these institutions so attempting to include them both in the same 'economy' leads to the muddle and confusion that is now apparent. The new macroeconomics may appeal to the White Queen but is of no other use.

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[16] Solow (1986, 2010) has consistently warned against the consequences of this false equivalence.

This is particularly true of so-called dynamic stochastic general equilibrium models as they are nothing more that 'calibrated' versions of new Keynesian models that attach money and other frictions onto a 'real' business cycle core. But the 'real' business cycle core rests on Arrow-Debreu microeconomic foundations that reduce it to *a model of perfect barter*. It has nothing to teach us about macroeconomics, money, credit and finance.

The sooner macroeconomists' realise this the sooner we can bring macroeconomics back from the dark ages and into the 21st century, or at least the 20th century.

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