Improved macroeconomic control with electronic money and modern monetary theory

Trond Andresen [The Norwegian University of Science and Technology, Norway]

Abstract
This paper combines the concept of electronic money (no physical currency) with Modern Monetary Theory (MMT). It argues – based on an MMT understanding of macroeconomics – how electronic monetary systems offer a big step forward for macroeconomic control, among other things by giving a government new and potent steering tools. More specifically the paper discusses how one in an electronic money environment can easily curb an overheated economy primarily through control of money velocity – not money supply. This is a necessary topic to explore, even if the opposite is needed in today's global situation, to convince academics and decision makers that running necessary large and persistent government budget deficits in depressed economies, is not "irresponsible" and does not need to imply strong inflation in later economic boom situations.

Keywords: modern monetary theory, electronic money, 100% reserve currency, money velocity, inflation control, stock/flow system

JEL classification: B50, E42, E5, G21, G28, H62

1. Introduction

In this author's opinion, the best theoretical platform for the understanding of today's macroeconomies and what might be done to improve them, is *Modern Monetary Theory* (from now on: "MMT"). MMT – also labeled "neo-chartalism" – has since the onset of the debt crises around 2008 gained influence in the global discourse on macroeconomic theory and crisis solutions. Some central academic proponents of MMT are L. Randall Wray, Stephanie Kelton, Scott Fullwiler, James Galbraith, and Bill Mitchell. A comprehensive text explaining MMT is (Wray, 1998). This paper assumes that the reader is somewhat familiar with, and not unsympathetic to, MMT.

In the MMT framework, a government and the Central Bank (CB) is seen as one unit. The "independence" of CB's that is the rule in most countries is a political and legal construct, and may as such be reversed by a national assembly. Any CB is constitutionally, at least in some final instance, an arm of the government. This is generally accepted, not solely by MMT adherents. For a country *issuing its own currency* (this is a prequisite for MMT to be valid as a platform for policy), a government's "debt" that builds up with its CB through deficit spending in excess of the income from selling bonds, is only an accounting convention. A government does not need to "finance" its spending through tax income or to borrow by issuing government bonds – a government may spend (and thus net create money) by debiting its account at the CB. Such a government is not revenue constrained. It can never "run out of" its own issued currency, and can always pay any debt if this debt is in its own – not foreign – currency. The role of taxes in MMT is to drain money to control demand and limit possible inflation, and to redistribute income.

In the MMT view, money has value and enjoys confidence since it is the only accepted means to pay taxes, and since the state can enforce tax payment. It does not need to be backed by any asset.

MMT assumes flexible exchange rates. Rigidly binding one's currency to foreign currency(-ies), removes the advantages of MMT. One is then on a de facto "gold standard", and this is incompatible with MMT.

The obvious and common objection to MMT is "it will be inflationary". Yes, inflation may be an issue. This is a reasonable objection and will therefore be discussed below. That said, inflation is a possibility under *any* macroeconomic regime if nominal aggregate demand is near or surpasses some capacity limit. The possibility of inflation is not *in itself* an argument against MMT. Through taxation and other methods inflationary pressures can effectively be taken care of within an MMT paradigm. How to achieve this is one of the main topics of this paper.

As discussed, a government may use the option of injecting new fiat money (*base money, High-Powered Money* – from now on "HPM") into circulation. But in today's system we mostly have net creation of money through bank lending. This *credit* money – as opposed to HPM – grows *endogenously*. Endogenous bank-created money growth is a consequence of what banks do to maximise their profits without breaching Basel capital adequacy rules (Andresen, 2010). Control of money supply from the CB via banks, as told in the monetarist and mainstream economics money multiplier story, is not possible. Therefore one should instead give the government a monopoly on money creation, so that all money is HPM: new money should be spent, not lent by the banks, into the economy. This fits well with the MMT view, and has for many decades been, and still is, supported by many economists and economic reformers. The most famous proponent of 100% money is probably Irving Fisher (1936). His and other economists' "Chicago Plan" has recently been re-evaluated with a very postive conclusion (Benes and Kumhof, 2012). When banks wish to lend in a 100% reserve scenario, they would have to borrow HPM at lower rates, and live off the rates difference. But they should not create money themselves. This will *ceteris paribus* make control of money creation and, therefore inflation, easier.

That said, control of money supply is not the central point in this paper – it will focus on control of another entity: *money velocity*. As this paper will show, control of velocity is much more effective, and it becomes feasible – for the first time in the history of money – with electronic money (i.e. no physical currency).

In a recession or even depression-like situation – the case in most countries today – the attraction of MMT is obvious: since a government with own-issued currency is not financially constrained, such a crisis can be remedied by running arbitrarily high fiscal deficits as long as needed, i.e. spending extra HPM into the economy to employ people and buy goods and services. A government issuing its own currency can always employ all the unemployed.

But there is a challenge to MMT that has hardly been discussed by its proponents: in the *opposite* scenario, if an economy is running close to full capacity or beyond (for instance after a crisis where a large amount of money was injected, remaining in circulation), and there are ensuing inflationary pressures: how can a government drain the system and curb money flows? This is a genuine problem, and is not easily solved in today's technical monetary environment. But there are solutions to this if all circulating money is electronic; transacted via the Internet and the mobile phone network, and residing only as accounts at a national depository facility.

Electronic money will mercilessly – sooner or later – take over simply due to technological progress. It offers a dramatic improvement in convenience and cost. Banks are already implementing it for that reason. The certain eradication of physical currency is only a question of time. The process is comparable to the advent of the digital camera, leading to the death of photographic film. Such processes cannot be reversed. Luckily, it turns out that fully electronic money systems are not only cheaper and more convenient, they also offer potent new opportunities for macroeconomic control.

2. A problem – injection and drainage asymmetry

There will be negligible opposition in a depressive situation if a government hires more people and buys more goods and services, with brand new HPM, created out of thin air at the CB – not even by borrowing. Such policy is possible with an MMT understanding of macroeconomics. In such a situation, people will gratefully accept this, in spite of alarms from deficit hawks and some financial pages pundits.

But when a government tries to drain money back later on in a boom, running a surplus over time by increased taxes, there will probably be strong popular resistance[1]. Furthermore, in a boom there will usually also be a widespread over-optimistic mood in the population, enhancing such resistance – which can take many forms: media campaigns, demonstrations, capital flight, tax avoidance, stashing away cash, voting for right-wing parties arguing for "small government" with low taxation.

MMT proponents have to address this issue, even if this is a hypothetical scenario diametrically opposite to today's. For it is difficult to convince the public, academics and decision makers today of the acceptability of large and persistent (over years) deficit spending, if one does not have a recipe for what to do in a later boom:

> It's true that printing money isn't at all inflationary *under current conditions*— that is, with the economy depressed and interest rates up against the zero lower bound. But eventually these conditions will end. At that point, to prevent a sharp rise in inflation the Fed will want to pull back much of the monetary base it created in response to the crisis, which means selling off the Federal debt it bought. So even though right now that debt is just a claim by one more or less governmental agency on another governmental agency, it will eventually turn into debt held by the public (Krugman, 2013).

3. Electronic money – the system

Today it is technically feasible to discard physical money completely – no bills and coins – and do all transactions by debit card, personal computers (both quite common in developed countries), and/or via the mobile phone network – not common, but on the rise. Mobile phone money transfers have a proven track record, for instance "M-Pesa" in Kenya (Hughes and Loonie, 2007). With electronic money ("EM") all transactions are reflected in movements between accounts. But there are in the proposed implementation here, no deposits with private

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[1] This may be considered analogous to the well-known downwards "stickiness" of wages and prices.

banks[2]. All accounts are at the Central Bank (or at a National Depository – "ND" from now on – established for that purpose).

All citizens and firms have EM accounts at the CB (or ND). The advantages are obvious and many:

1. The system is very cheap to run, compared to a system with bills and coins.
2. Adjustments that turn out to be needed, can be implemented in software, therefore very easily and cheaply. No cumbersome and expensive printing/stamping and distribution of bills and coins.
3. Forgery is impossible. So are robberies.
4. This is a 100% reserve system. All deposits are HPM (base money), at the CB (or ND). No deposit insurance needed. Money cannot be lost, and this is clear to the public. No bank runs.
5. EM is an extremely inclusive and convenient system, giving poor and rural sectors of an economy – where ATMs and bank branches may be far between and not all people have accounts – a tool for easy economic participation and exchange.
6. A black economy in EM is close to impossible. The same with tax evasion. Intelligent software can monitor transactions 24/7, and flag human operators when suspicious patterns emerge. Knowledge of this implies a credible threat, so that agents to a significant degree will abstain.
7. EM cannot be used for capital flight, since it only resides at the CB (or ND). All foreign transactions are logged and thus controllable, as suggested in the previous point.

Finally, two unconventional advantages/possibilities:

8. Negative interest on money held (demurrage) may be easily implemented, to speed up circulation if that is needed.
9. A new possible control tool with the opposite effect is feasible by money only existing as accounts at the CB (or ND): A tiny but adjustable *transfer tax between any accounts.* This would be incredibly more effective to damp an overheated economy, than today's blunt tool of a CB interest rate increase. It can stop too much spending in its tracks.

In the next section we will discuss how some of the above advantages enable the government to curb spending in an economically overheated scenario.

4. Spending control

4.1 Money velocity is a crucial factor

It is first necessary to make an important point about money supply and money flows. Demand in an economy is not decided by the aggregate money supply (a *stock*), but by the aggregate of money *flows Y,* where *Y* is GDP. In a continuous-time modeling framework, the denomination of *Y* is [$/year], as opposed to *M* [$]. In nominal terms we have

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[2] But private and cooperative banks still have a role to play: to vet and lend to borrowers, using funds gotten by selling bonds, offering time deposits or borrowing from the CB.

$$Y(t) = M(t)v(t),$$

where *M* is aggregate money stock and *v* is average money velocity. This is the quantity equation, adhered to by monetarists, and (much for the same reason) derided by many other economists. In this author's opinion, the monetarists are wrong because they ignore *v* and focus solely on *M*. There are also mainstream economists who point to the insufficiency of using *M* as a control variable:

> In terms of the quantity theory of money, we may say that the velocity of circulation of money does not remain constant. "You can lead a horse to water, but you can't make him drink." You can force money on the system in exchange for government bonds, its close money substitute; but you can't make the money circulate against new goods and new jobs (Samuelson, 1948:354).

But many outside the current mainstream are also wrong – not because they (correctly) argue that *M* is not a sufficient control variable – but because they consider *v* of no importance:

> Unfortunately, most economists are brainwashed with the trivializing formula MV=PT. The idea is that more money (M) increases "prices" (P) – presumably consumer prices and wages. (One can ignore velocity, "V," which is merely a tautological residual.) "T" is "transactions," for GDP, sometimes called "O" for Output (Hudson, 2010).

This might be characterised as throwing the *Mv* baby out with the *M* bathwater. One economist who saw the importance of velocity, was Irving Fisher:

> Free money may turn out to be the best regulator of the velocity of circulation of money, which is the most confusing element in the stabilization of the price level. Applied correctly it could in fact haul us out of the crisis in a few weeks ... I am a humble servant of the merchant Gesell (Fisher, 1933:67).

Fisher argued for a parallel money in the depression-ridden U.S., and levying a holding fee (negative interest, *demurrage* – originally proposed by the German-Argentinian merchant and monetary theorist Silvio Gesell[3]) on this money to force agents to spend. Thus it would be possible to increase activity even for a small *M*, due to higher *v*. Fisher understood that *v* is not a "residual" as Hudson calls it, but an important behavioural variable, and that it would be low in a depression, and needed to be boosted. It is strange that this is not more recognised, since *v* is in a one-to-one relation to (inverse) liquidity preference, and liquidity preference is a concept that is widely accepted and used among macroeconomists – not the least by Post Keynesians, who are very much against the quantity theory.

4.2 Control with electronic money

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[3] Gesell received a strong recommendation in the *General Theory* (Keynes , 1973:355)

In today's system with credit creation of money through bank lending, control of *M*, as emphasised in monetarist and mainstream economics, is not possible. For credit money – as opposed to HPM – grows endogenously as already mentioned. Giving the CB monopoly on money creation, so that all money is HPM, will make such control more feasible.

With electronic money one is able to not only enhance control of *M* , but also achieve control of *v*, which until now has been mostly ignored (in part because such control is very difficult in a system containing physical currency). While *M* cannot be changed significantly within a short time span (since it is a stock and needs time to change, and since draining M wil be a controversial extra tax), this may be done with *v* (since it is a behavioural variable, not a stock, and no liquid assets are taken from the holders). By having control of both *M* and (especially) *v*, one may exercise potent control[4] of their product, $Y = Mv$.

There are (theoretically) a quadruple of ways to do *Mv* control:

1. *A fee (negative interest, demurrage) on money held: M* decreases slowly, *v* increases strongly and immediately, therefore *Y* increases immediately. And the government can exploit shrinking *M* by creating a corresponding extra HPM flow and thus spend more. This is a bonus in a recession/depression.
2. *A fee on transferring money between accounts: M* falls slowly, *v* falls immediately, therefore *Y* decreases immediately.
3. *Positive interest on money held:* in checking accounts, the opposite of item 1. This is today's sole tool: *M* increases slowly, *v* may decrease a little but slowly, therefore *Y* hopefully decreasing, but this is very mood-dependent.
4. *A small reward for transferring money between accounts:* the opposite of item 2, *M* grows persistently and exponentially, *v* increases strongly, *Y* "explodes".

Item 4 is obviously absurd, since agents can then increase their money holdings just by transferring money back and forth. It will be ignored in the following. I will now discuss the new possibilities given by items 1 and 2, and especially item 2.

Negative interest on money held (item 1) works, as demonstrated by the Wörgl parallel local crisis currency in 1932 (Lietaer, 2010), where money velocity turned out to be 12 – 14 times the velocity of the Austrian schilling[5]. This was also an inspiration for Irving Fisher's (futile) attempts to get a similar solution implemented in the depression-ridden U.S. But the Wörgl technical demurrage solution was cumbersome: one had to buy a stamp every month and glue it to a bill, for the bill to uphold its validity. And with coins one cannot even do that. With electronic money however, it is exceedingly simple: every day a tiny proportion of the amount in a checking account is deducted. And this proportion may be easily adjusted as the state of the economy changes.

Now to item 2: a fee on transferring money between accounts. *As far as this author knows, this is a new concept* in the context of economics, and easily implemented in an electronic money framework. One could object that it resembles a value added tax, but the important

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[4]
  Note that I at this stage abstract from *fiscal* control tools. These are important, although not for the purposes of this paper. I will return briefly to them.
[5]
  After one year's successful operation it was prohibited and shut down by the Austrian Central Bank.

difference is that the fee is on *all* transfers, not only for purchases from firms (one may of course have a VAT like today, in parallel with an account transfer fee). This property, combined with all money residing as checking accounts at the CB (or ND), makes avoiding the fee impossible and removes all need of human control. The size needed for such a fee to have an impact is difficult to decide ex ante, but a conjecture is that this measure will be quite potent, comparable to demurrage on money held. One could start with a very low (and therefore economically and politically harmless) level – say 0.1% – and monitor the impact. If the impact in a trial period is too small, increase the fee a little.

4.3 Fiscal policy with electronic money

From an MMT perspective, fiscal policy is more important than monetary policy. All money as electronic HPM in accounts at the CB (or ND) will make taxation and levying of fees easier. This will be the case both for collection, control and adjustment. Tax evasion and crime will be sharply reduced as already mentioned. The need for human control will be much lower, since detailed monitoring may be done by software which alerts human operators only when suspicious patterns are detected.

Possibilities for capital flight will be sharply reduced, even if this cannot be completely eradicated (capital controls in an electronic money environment should be a topic for further research).

5. Concluding remarks

Electronic money, applied with an MMT understanding, enables a revolution in macroeconomic control. But his insight will probably not be at the center of media hype and attention as electronic money becomes more widespread . The goal of this paper is to contribute to ensuring that the most important advantages of electronic money are not lost in the process.

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Author contact: trond.andresen@itk.ntnu.no

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