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<pt>The macroeconomics of endogenous money: response to Fiebiger, Palley and Lavoie

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<a>1 INTRODUCTION

Marc Lavoie is correct that I was addressing too many audiences in my paper (Keen 2014) – post-Keynesian macroeconomists, neoclassical macroeconomists, and the general public – and that this confused the exposition. In my reply I will restrict myself just to the first audience – post-Keynesian macroeconomists who accept that the money supply is endogenous – though I will also contrast this audience's position with neoclassical arguments.

In Section 2 I clarify and correct my core proposition by deriving, from simple expenditure matrices, that – given the endogeneity of money – aggregate demand *and aggregate income* necessarily include the change in debt. In Section 3 I address specific criticisms of other aspects of my paper, including my interpretation of precedents in the literature.

<a>2 THE ROLE OF THE CHANGE IN DEBT IN AGGREGATE DEMAND AND AGGREGATE INCOME

Consider three hypothetical monetary systems:

<ll>

A. Neither borrowing nor lending is possible.
B. Borrowing and lending are possible, but only from one sector (or agent) to another (Loanable Funds).
C. Banks lend to non-banks (Endogenous Money).

</ll>

In Case A, all expenditure by all agents (or sectors) must be financed out of income.[1] In Case B, expenditure by any sector (or agent) can be financed either out of income or by borrowing from other sectors. In Case C, expenditure by any sector can be financed either out of income, by

[1] It is more correct to say that expenditure out of existing money is the only source of income – thus reversing 'Say's law' with the proposition that 'Demand creates its own supply'.

borrowing from other sectors (which is ignored below since it replicates case 2), *or by borrowing from a bank* (an action which increases equally the assets and the liabilities of the banking sector).

Aggregate demand and aggregate income in all three cases can be described by expenditure matrices in which the notation $\boldsymbol{E_{xy}}$ represents expenditure *in the absence of borrowing* by sector $\boldsymbol{x}$ to purchase output from sector $\boldsymbol{y}$. The rows of the matrices show expenditure by each sector, and the columns show net income. Aggregate demand is the negative of the sum of the diagonal elements of each matrix, while aggregate income is the sum of the off-diagonal elements.

Three sectors are used below for the purposes of illustration, but the argument generalizes to more than 3 sectors and (when borrowing is considered) to more than one sector borrowing.

<a>3 A SINGLE INJECTION OF DEBT

Table 1 No borrowing or lending is possible (Case A)

Activity\Sector	Sector 1	Sector 2	Sector 3
Sector 1 Expenditure	$-(E_{1,2} + E_{1,3})$	$E_{1,2}$	$E_{1,3}$
Sector 2 Expenditure	$E_{2,1}$	$-(E_{2,1} + E_{2,3})$	$E_{2,3}$
Sector 3 Expenditure	$E_{3,1}$	$E_{3,2}$	$-(E_{3,1} + E_{3,2})$

Equation (1) shows aggregate demand $\boldsymbol{AD_A}$ and aggregate income $\boldsymbol{AY_A}$ for Case A.

<equation>

$$\begin{aligned} AD_A &= \left(E_{1,2} + E_{1,3}\right) + \left(E_{2,1} + E_{2,3}\right) + \left(E_{3,1} + E_{3,2}\right) \\ AY_A &= E_{1,2} + E_{1,3} + E_{2,1} + E_{2,3} + E_{3,1} + E_{3,2} \end{aligned} \tag{1}$$

</equation>

Thus, in Case A, aggregate expenditure is aggregate income.

In Case B (shown in Table 2), sector 1 borrows the amount □***D*** from sector 2, and immediately spends it buying output from sectors 2 and 3 in the proportions □ and ***(1–□)*** respectively. Because sector 2 has devoted part of its capacity to buy to lending □***D*** to sector 1 instead, its purchases from sectors 1 and 3 fall by the same amount, and this fall is distributed in the ratios □ and ***(1–□)*** respectively in sector 2's expenditure upon sectors 1 and 3.[2]

Table 2 Borrowing and lending between sectors occurs (Case B: Loanable Funds)

Activity\Sector	Sector 1	Sector 2	Sector 3
Sector 1 Expenditure	$-([E_{1,2} + \square\square\square\mathbf{D}] + [E_{1,3} + \boldsymbol{(1-\square).}\square\mathbf{D}])$	$E_{1,2} + \square\square\square\mathbf{D}$	$E_{1,3} + \boldsymbol{(1-\square).}\square\mathbf{D}$

[2] I am ignoring here changes in behaviour as a result of the lending, including a change in spending of unspent money hoards.

Sector 2 Expenditure	$E_{2,1} - \square\square\square\mathbf{D}$	$-([E_{2,1} - \square\square\square\mathbf{D}] + [E_{2,3} - \boldsymbol{(1-\square).\square}\mathbf{D}])$	$E_{2,3} - \boldsymbol{(1-\square).\square}\mathbf{D}]$
Sector 3 Expenditure	$E_{3,1}$	$E_{3,2}$	$-(E_{3,1} + E_{3,2})$

Equation (2) shows aggregate demand and aggregate income in this system prior to cancellation of duplicate terms:

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$$\begin{aligned} AD_B &= \Delta D\cdot(\beta-1) - \Delta D\cdot(\alpha-1) - \beta\cdot\Delta D + \alpha\cdot\Delta D + \\ &\quad (E_{1,2}+E_{1,3}) + (E_{2,1}+E_{2,3}) + (E_{3,1}+E_{3,2}) \\ AY_B &= \Delta D\cdot(\beta-1) - \Delta D\cdot(\alpha-1) - \beta\cdot\Delta D + \alpha\cdot\Delta D + \\ &\quad (E_{1,2}+E_{1,3}) + (E_{2,1}+E_{2,3}) + (E_{3,1}+E_{3,2}) \end{aligned} \tag{2}$$

</equation>

Thus the change in debt turns up as an argument, but (ignoring changes in behaviour or the spending of unspent hoards) the change in debt cancels out as shown in equation (3):

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$$\begin{aligned} AD_B &= (E_{1,2}+E_{1,3}) + (E_{2,1}+E_{2,3}) + (E_{3,1}+E_{3,2}) \\ AY_B &= E_{1,2}+E_{1,3}+E_{2,1}+E_{2,3}+E_{3,1}+E_{3,2} \end{aligned} \tag{3}$$

</equation>

Thus in Case B, aggregate expenditure is aggregate income.

In Case C (shown in Table 3), sector 1 borrows the amount $\square\boldsymbol{D}$ from the banking sector (not shown here).[3]

Table 3 Borrowing from and lending by banks occurs (Case C: Endogenous Money)

Activity\Sector	Sector 1	Sector 2	Sector 3
Sector 1 Expenditure	$-([E_{1,2} + \square\square\square\mathbf{D}] + [E_{1,3} + \boldsymbol{(1-\square).\square}\mathbf{D}])$	$E_{1,2} + \square\square\square\mathbf{D}$	$E_{1,3} + \boldsymbol{(1-\square).\square}\mathbf{D}$
Sector 2 Expenditure	$E_{2,1}$	$-(E_{2,1} + E_{2,3})$	$E_{2,3}$
Sector 3 Expenditure	$E_{3,1}$	$E_{3,2}$	$-(E_{3,1} + E_{3,2})$

Equation (4) shows aggregate demand and aggregate income in this system prior to cancellation of duplicate terms:

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[3] The banking sector's assets and liabilities rise equally because of the loan.

$$
\begin{aligned}
AD_C &= E_{1,2} + \alpha \cdot \Delta D + E_{1,3} + (1-\alpha) \cdot \Delta D + \\
&\quad (E_{2,1} + E_{2,3}) + (E_{3,1} + E_{3,2}) \\
AY_C &= E_{1,2} + \alpha \cdot \Delta D + E_{1,3} + (1-\alpha) \cdot \Delta D + \\
&\quad E_{2,1} + E_{2,3} + E_{3,1} + E_{3,2}
\end{aligned}
\tag{4}
$$

</equation>

Thus the change in debt turns up as an argument, as in Case B. However, in contrast to Case B, the change in debt does *not* cancel out. Instead, as shown in equation (5), *both aggregate demand and aggregate income* are boosted by the amount ΔD:

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$$
\begin{aligned}
AD_C &= \Delta D + (E_{1,2} + E_{1,3}) + (E_{2,1} + E_{2,3}) + (E_{3,1} + E_{3,2}) \\
AY_C &= \Delta D + (E_{1,2} + E_{1,3}) + (E_{2,1} + E_{2,3}) + (E_{3,1} + E_{3,2})
\end{aligned}
\tag{5}
$$

</equation>

There are three ways to express this result for Case C. Given the endogenous creation (and destruction) of money by the banking sector:

<nl>

1. Aggregate demand plus the change in debt equals aggregate income plus the change in debt; or
2. Aggregate demand equals aggregate income, and the change in debt causes the change in both; or
3. Aggregate demand equals demand generated out of the turnover of existing money, plus demand generated by the creation of new money through the change in debt, and this causes an equivalent change in aggregate income.

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The third method is the most fruitful way of describing the role of the change in debt in both aggregate demand and aggregate income,[4] and this generalizes to the situation of a continuous flow of new debt.

<a>4 A CONTINUOUS FLOW OF NEW DEBT

Table 4 shows the situation for Case B (now re-titled Loanable Funds) when spending is financed by a flow of funds from existing stocks of money ($\boldsymbol{S_1}$, $\boldsymbol{S_2}$ and $\boldsymbol{S_3}$) with flow rates $\Delta_{\mathbf{xy}}$, (where $\Delta_{\mathbf{xy}}$ is a time constant dimensioned in years so that the flow $\boldsymbol{S_x}/\Delta_{\mathbf{xy}}$ is dimensioned in

[4] The first statement implies that the change in debt can be cancelled from both sides, which reduces the expression to the same as for Loanable Funds; the second emphasizes the dynamic role of debt, but not its connection with the creation of new money.

dollars per year)[5] and in which there is a flow of new debt $\frac{d}{dt}D$ from sector 2 to sector 1 (also dimensioned in dollars per year – and which can be positive or negative), which sector 1 then spends on the outputs of sectors 2 and 3. The lent funds diminish sector 2's capacity to buy from sectors 1 and 3 in the ratios □ and (***1***–□) as before. In addition, interest payments at the rate $\boldsymbol{r_L}$ on the outstanding level of debt ***D*** from sector 1 to sector 2 must be considered.

Table 4 Inter-sectoral borrowing is possible (Case B: Loanable Funds)

"Activity\Sector"	S_1	S_2	S_3
"Expenditure"	$-\left(\frac{S_1}{\tau_{12}}+\frac{S_1}{\tau_{13}}+\frac{d}{dt}D\right)-r_L\cdot D$	$\frac{S_1}{\tau_{12}}+\alpha\cdot\frac{d}{dt}D+r_L\cdot D$	$\frac{S_1}{\tau_{13}}+(1-\alpha)\cdot\frac{d}{dt}D$
"Expenditure"	$\frac{S_2}{\tau_{21}}-\beta\cdot\frac{d}{dt}D$	$-\left(\frac{S_2}{\tau_{21}}+\frac{S_2}{\tau_{23}}-\frac{d}{dt}D\right)$	$\frac{S_2}{\tau_{23}}-(1-\beta)\cdot\frac{d}{dt}D$
"Expenditure"	$\frac{S_3}{\tau_{31}}$	$\frac{S_3}{\tau_{32}}$	$-\left(\frac{S_3}{\tau_{31}}+\frac{S_3}{\tau_{32}}\right)$

Equation (6) shows that aggregate expenditure and aggregate income include the payment of interest on outstanding debt:

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$$AD_{LF}=\left(\frac{1}{\tau_{1,2}}+\frac{1}{\tau_{1,3}}\right)\cdot S_1+\left(\frac{1}{\tau_{2,1}}+\frac{1}{\tau_{2,3}}\right)\cdot S_2+\left(\frac{1}{\tau_{3,1}}+\frac{1}{\tau_{3,2}}\right)\cdot S_3+r_L\cdot D$$
$$AY_{LF}=\left(\frac{1}{\tau_{1,2}}+\frac{1}{\tau_{1,3}}\right)\cdot S_1+\left(\frac{1}{\tau_{2,1}}+\frac{1}{\tau_{2,3}}\right)\cdot S_2+\left(\frac{1}{\tau_{3,1}}+\frac{1}{\tau_{3,2}}\right)\cdot S_3+r_L\cdot D \quad (6)$$

</equation>

Aggregate monetary expenditure and aggregate monetary income thus include interest on outstanding debt in a continuous time Loanable Funds model, but the change in debt plays no role.

Table 5 shows the situation for Case C (now re-titled Endogenous Money) when the flow of new debt is from the banking sector to sector 1. As interest payments now go from sector 1 to the banking sector, an additional column $\boldsymbol{B_E}$ ('Bank Equity') is added into which interest payments are made. The existing stocks of money ($\boldsymbol{S_1}$, $\boldsymbol{S_2}$ and $\boldsymbol{S_3}$) are now treated as bank deposits, so deposit interest is payable on them at the rate $\boldsymbol{r_D}$ from the account $\boldsymbol{B_E}$. For simplicity, sectors 1 to

[5] Simple parameters could be used here, but time constants have the advantage of being dimensioned in the time unit of the model (years here; in engineering applications the time dimension is usually seconds). The term 'constant' is somewhat misleading in that these parameters are easily varied, as shown in the simulation below. See http://en.wikipedia.org/wiki/Time_constant for further details.

3 are shown as not buying anything from $\boldsymbol{B_E}$, while $\boldsymbol{B_E}$ buys from all 3 sectors at the rates $\square_{\mathbf{B1}}$, $\square_{\mathbf{B2}}$, and $\square_{\mathbf{B3}}$ respectively.

Table 5 Bank lending exists (Case C: Endogenous Money)

"Activity\Sector"	S_1	S_2	S_3	B_E
"Expenditure"	$-\left(\frac{S_1}{\tau_{12}}+\frac{S_1}{\tau_{13}}+\frac{d}{dt}D\right)-r_L\cdot D$	$\frac{S_1}{\tau_{12}}+\alpha\cdot\frac{d}{dt}D$	$\frac{S_1}{\tau_{13}}+(1-\alpha)\cdot\frac{d}{dt}D$	$r_L\cdot D$
"Expenditure"	$\frac{S_2}{\tau_{21}}$	$-\left(\frac{S_2}{\tau_{21}}+\frac{S_2}{\tau_{23}}\right)$	$\frac{S_2}{\tau_{23}}$	0
"Expenditure"	$\frac{S_3}{\tau_{31}}$	$\frac{S_3}{\tau_{32}}$	$-\left(\frac{S_3}{\tau_{31}}+\frac{S_3}{\tau_{32}}\right)$	0
"Expenditure"	$\frac{B_E}{\tau_{B1}}+r_D\cdot S_1$	$\frac{B_E}{\tau_{B2}}+r_D\cdot S_2$	$\frac{B_E}{\tau_{B3}}+r_D\cdot S_3$	$-\left[\left(\frac{B_E}{\tau_{B1}}+r_D\cdot S_1\right)+\left(\frac{B_E}{\tau_{B2}}+r_D\cdot S_2\right)+\left(\frac{B_E}{\tau_{B3}}+r_D\cdot S_3\right)\right]$

Equation (7) shows aggregate demand and aggregate income in this system.

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$$\begin{aligned} AD_{EM} &= \left(\frac{1}{\tau_{1,2}}+\frac{1}{\tau_{1,3}}\right)\cdot S_1+\left(\frac{1}{\tau_{2,1}}+\frac{1}{\tau_{2,3}}\right)\cdot S_2+\left(\frac{1}{\tau_{3,1}}+\frac{1}{\tau_{3,2}}\right)\cdot S_3+\left(\frac{1}{\tau_{B,1}}+\frac{1}{\tau_{B,2}}+\frac{1}{\tau_{B,3}}\right)\cdot B_E \\ &\quad +r_D\cdot\left(S_1+S_2+S_3\right)+r_L\cdot D+\frac{d}{dt}D \\ AY_{EM} &= \left(\frac{1}{\tau_{1,2}}+\frac{1}{\tau_{1,3}}\right)\cdot S_1+\left(\frac{1}{\tau_{2,1}}+\frac{1}{\tau_{2,3}}\right)\cdot S_2+\left(\frac{1}{\tau_{3,1}}+\frac{1}{\tau_{3,2}}\right)\cdot S_3+\left(\frac{1}{\tau_{B,1}}+\frac{1}{\tau_{B,2}}+\frac{1}{\tau_{B,3}}\right)\cdot B_E \\ &\quad +r_D\cdot\left(S_1+S_2+S_3\right)+r_L\cdot D+\frac{d}{dt}D \end{aligned} \tag{7}$$

</equation>

The rate of change of debt, interest on deposits and interest on existing debt are thus all arguments to both aggregate expenditure and aggregate income. This is the essential difference in the macroeconomics of Endogenous Money, when compared to the macroeconomics of Loanable Funds.

The change in debt is ignored in Loanable Funds for the *legitimate* reason that, in that model, the debt-financed increase in spending power by the borrower is largely offset by a diminished spending power for the lender.[6] Proponents of the Loanable Funds model are therefore intellectually consistent when they argue that, because changes in private debt are 'pure redistributions' in their model, they 'should have no significant macro-economic effects' (Bernanke 2000, p. 24). The only criticism one can make of Loanable Funds is whether it is an

[6] I say 'largely' here because there will be changes in the level of spending from the redistribution of money by lending that are not considered here, but will be considered in models in a subsequent paper.

accurate model of lending – which it plainly is not, as no less an authority than the Bank of England has recently emphasized (McLeay et al. 2014).

However in Endogenous money the increased spending power of the borrower is *not* offset by a fall in the spending power of any other sector (or agent), as the spending power is created by an equal increase in the assets and the liabilities of the banking sector. As shown by equation (7), it is therefore logically essential that change in debt be incorporated into post-Keynesian monetary macroeconomic models.

This requires a redefinition of both aggregate demand and aggregate income to reflect these essentially monetary insights. Aggregate income has three components: income from the turnover of existing money; income from interest on existing debt and money; and income generated by new money created by new debt. Aggregate demand also has the same three components, and the shorthand phrase I have used, that 'aggregate demand is income plus the change in debt' is better phrased as 'aggregate demand is demand generated from the turnover of existing money plus demand generated by the change in debt'.[7] Using $\boldsymbol{V}$ for the velocity of circulation of existing money and $\boldsymbol{M}$ for the sum of sectoral bank balances $\boldsymbol{S_1}$ to $\boldsymbol{S_3}$ plus bank equity $\boldsymbol{B_E}$, this implies the relationship below – which can be regarded as a dynamic endogenous money generalization of Friedman's velocity equation (Friedman 1969):

<equation - add full stop at end.>

$$AD_{EM} = AY_{EM} = V \cdot M + \frac{d}{dt} D + r_D \cdot M + r_L \cdot D \tag{8}$$

</equation>

This is in contrast to the situation for Loanable Funds:

<equation - add full stop at end.>

$$AD_{LF} = AY_{LF} = V \cdot M + r_L \cdot D \tag{9}$$

</equation>

<a>5 DEBT ACCELERATION AND CHANGE IN AGGREGATE DEMAND AND INCOME

When rates of change are considered, then since the level of money is a function of the level of debt, and the rate of change of the money supply is primarily the rate of change of debt,[8] all three moments of the level of debt – its level, rate of change, and acceleration – are factors in the rates of change of aggregate demand and aggregate income. Given this and equation (8), then (though $\boldsymbol{V}$ itself is determined by the level of bank accounts and the value of the time constants), equation

[7] Plus also interest income from existing debt.

[8] Fiat money creation, which adds an additional source of both money and money creation, is not considered in this paper but can easily be incorporated in the analysis.

(10) is a valid first-order statement[9] of the relationship between the change in aggregate demand (and aggregate income) and debt:

<equation - add full stop at end.>

$$\frac{d}{dt} AD_{EM} = \frac{d}{dt} AY_{EM} = M \cdot \frac{d}{dt} V + V \cdot \frac{d}{dt} D + \frac{d^2}{dt^2} D \qquad (10)$$

</equation>

This can be contrasted with the change in aggregate demand and aggregate income given Loanable Funds:

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$$\frac{d}{dt} AD_{LF} = \frac{d}{dt} AY_{LF} = M \cdot \frac{d}{dt} V \qquad (11)$$

</equation>

Loanable Funds thus omits the contributions to the change in aggregate demand and aggregate income from both the rate of change and the acceleration of debt.

<a>6 OF INTUITIONS, TAUTOLOGIES AND PROOFS

Fiebiger and Lavoie see a mere tautology in Minsky's (1975) mathematics. To cite Fiebiger (2014, p. 295):

<quotation>

> Given the parameters specified, Minsky's (1975, p. 133) deduction that ΔMt must be the source of growth allows $Y_{t\ ex\ ante} > Y_{t-1\ ex\ post}$ to be viewed as a tautology. While Y here means either aggregate demand or aggregate income, we could state both claims separately in reference to the time periods [t] and [t–1], just to clarify the logic of what happens when there is economic growth:
>
> aggregate expenditure$_{[t]}$ exceeds aggregate expenditure$_{[t-1]}$ (1)
>
> aggregate income$_{[t]}$ exceeds aggregate income$_{[t-1]}$ (2)
>
> Claims such as 'expenditure exceeds expenditure' or 'income exceeds income' are surely confusing without explicit time-period qualifiers and a caveat that the discussion is about a growing economy. Yet, once those qualifiers are added and understood, all that is being communicated is of a purely tautological form.

[9] The terms based on deposit and loan interest are omitted to save space, but can easily be inferred by the reader.

</quotation>

Why would Minsky devote so much time and intellectual effort to a mere tautology which can be reduced to the trivial statement that 'income grows over time'? What I saw instead was an attempt to elucidate a causal mechanism, the need for which he first identified in 1963:

<quotation>

> For real aggregate demand to be increasing, given that commodity and factor prices do not fall readily in the absence of substantial excess supply, *it is necessary* that current spending plans, summed over all sectors, be greater than current received income and *that some market technique exist by which aggregate spending in excess of aggregate anticipated income can be financed*. *It follows that* over a period during which economic growth takes place, at least *some sectors finance a part of their spending by emitting debt* or selling assets. (Minsky 1963; Minsky 1982, p. 6; added emphasis)

</quotation>

Minsky's accurate intuition was that, as aggregate demand normally rises in a capitalist economy and yet commodity prices do not normally fall, then *somehow* rising debt had to have a role in the levels of both aggregate demand and aggregate income. His later mathematics (Minsky 1975, pp. 132–133) was an attempt to derive that causal mechanism. That followers of Minsky such as Fiebiger and Lavoie can see a mere tautology here shows that Minsky's proof was not persuasive. But his intuition was still correct.

I have also been trying to derive that causal mechanism, and the debate in this journal has helped me develop a proof that clarifies the proposition, and that I hope is persuasive. Though I accept that my expression of this intuition prior to developing this proof was confusing (as all three critics note), and easily interpreted as violating the principle that '[e]xpenditures on current output *always* create income because market exchanges *necessarily* involve two agents: a buyer and a seller' (Fiebiger 2014, pp. 295–296, original emphasis), the proof here proceeds directly from that principle to show that, given endogenous money, both aggregate demand and aggregate income include the change in debt.

<a>7 OTHER ISSUES

The relationships between change in debt and aggregate demand and income derived in this paper are the explanations for the very high correlations shown in my initial paper between the rate of change of debt and employment, and the acceleration of mortgage debt and change in house prices (Keen 2014, figs 4 and 6). These were not addressed by any of my critics, though Fiebiger (2014) does devote substantial space to important empirical issues. The causal relationship in equation (10) between change and acceleration in debt and the rate of change of aggregate demand explains those extremely high correlations – even though there are problems with the recording of monetary data.

On this, Fiebiger notes that I ignore nonbank debt and the role of NBFIs – and that I also did not include bank lending to NBFIs in my empirical data. This decision was driven by the nature of the Flow of Funds data, since at highly disaggregated levels that data *does not* distinguish between lending by banks, lending by nonbanks, and even lending by nonbanks to banks – though it appears to do so at higher levels of aggregation. It was simply impossible to disentangle this data in any meaningful way to identify lending that creates money from lending that redistributes it. I therefore reluctantly omitted that data from my empirical work.

The relationship between the real economy and the FIRE sector was also omitted in order to be able to focus on the macroeconomic aspects of endogenous money alone; FIRE sector issues as outlined by Fiebiger are crucial and will be taken up with co-authors in later papers (for prelude papers see Hudson 2010; Bezemer 2011).

Though Palley agrees with my insight on the role of changes in debt in aggregate demand, he criticizes me for not considering 'injections into and leakages from the circular flow of income':

<quotation>

> The central analytic problematic in the Keynesian theory of aggregate demand is that of injections into and leakages from the circular flow of income. The problem with Keen's treatment (in all three instances) is that it completely overlooks this and has nothing to say about it. (Palley 2014, p. 313)

</quotation>

Some of the apparent conflict here relates to Palley's use of period analysis versus my use of continuous time, and some results from inadequacies in my attempts to express my continuous time analysis in period terms in Keen (2014). I have elsewhere criticized period analysis as a poor tool for economic dynamics (Keen 2006), and while I attempted to state my argument in period terms in Keen (2014), I have deliberately refrained from period analysis here. That said, 'leakages and injections' exist in my model – in the sense that issuance of new debt and repayment of existing debt are injections and leakages that respectively increase and decrease money in circulation.

Apart from that, I feel that 'leakages and injections' is an inappropriate metaphor. With truly 'notably rare exceptions', to parody Alan Greenspan (2011) – such as when you drop a quarter down a grate – money does not 'leak' out of the monetary system in anything like the manner that water leaks out of a pipe. Instead it flows from one account to another, but at differing speeds – which in turn generates a different aggregate velocity of circulation.

It is therefore not the case that '[c]hanges in income are therefore driven exclusively by borrowing and loan repayment' (Palley 2014, p. 314) as velocity is also not a constant (ibid., p. 319) but a derived variable depending on the distribution of money and income, and the rates of flows of money between sectors. As expressing the impact of endogenous money on macroeconomics requires distinguishing expenditure (and income) financed by the circulation of existing money from expenditure financed by the creation of new money, the rate of circulation

of money becomes an essential component of monetary macroeconomics. That Friedman distorted the concept by assuming (and trying to statistically establish) that velocity was a constant when in reality it is 'procyclical and quite volatile' (Kydland and Prescott 1990, p. 15) should not stop post-Keynesians developing a sensible analysis of it.

Fiebiger (2014, pp. 300–302) argues that endogenous money did not play a crucial role in Minsky's development of the Financial Instability Hypothesis and that I have made a narrow 'endogenous money reading' of Minsky, Keynes and Schumpeter. I certainly focused on endogenous money statements and underplayed loanable funds comments by those authors. The reason for doing so was that, as illustrated in the first section of this paper, if loanable funds applies, then the contribution of the change in debt to aggregate demand is logically close to zero, as neoclassical economists argue, and Endogenous Money would therefore be a macroeconomic sideshow which, by Occam's Razor, could comfortably be ignored in economic analysis. This is the false perspective from which we need to escape to develop a meaningful, monetary macroeconomics.

As Lavoie notes, similar insights on the role of the change in debt in aggregate demand have been expressed by other authors in addition to those I cited in Keen (2014), and I thank him for alerting me to Eichner's contribution. As with Minsky's contribution, Lavoie (2014, p. 327) argues that Eichner was in error in claiming that aggregate demand is equal to national income plus the increase in bank credit. I believe that while Eichner's verbal expression of this may have been flawed – as mine was prior to this debate – his insight was correct, as was Minsky's. I hope that in this paper I have shown why.

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