Discuss the endogenous money-led macroeconomic model and its policy implications. Illustrate your answer using relevant diagrams and equations.

In this paper I will explain the endogenous money model (EMM), discuss competing post-Keynesian endogenous money schools, with Palley (1994; 1998; 2001) and Dow (2006) representing the structuralist side and Lavoie (2006) the accommodationists. Diverging policy implications will be discussed and a structuralist framework will be used to analyse a credit crunch.

Explaining the EMM

Financial markets

The financial markets in the EMM are described in Figure I.

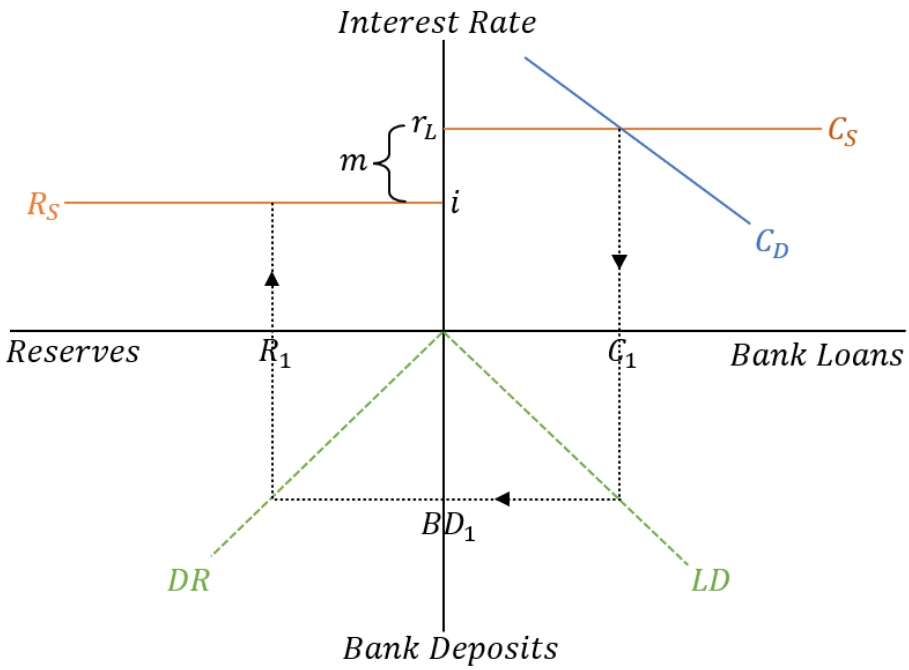

Figure I – author's recreation of Figure 8.1 from (Fontana & Setterfield, 2009, p. 147)

We begin in the top-right quadrant which shows equilibrium in the credit market: $C_S = C_D$. Demand for credit is perfectly accommodated by commercial banks at a rate $r_L = (1 + \mu)i$ where μ is a mark-up charged over the central bank's reserve rate i. $C_S = C_D$ such that there

are C_1 bank loans. Once these loans are deposited into accounts, there are $BD1$ demand deposits for which banks demand R_1 reserves, either due to legal requirements or liquidity concerns. The exact ratios of loans-to-deposits and deposits-to-reserves are given by LD and DR and set to unity for simplicity.

Goods Market

The goods market is described by the equilibrium between aggregate demand and aggregate supply; see Figure III below.

To derive AD in $[y, P]$ space, we start with the important equation:

1. $AD = ND + cD$

This recognises that all demand in an economy is either debt or non-debt financed, cD and ND respectively. We assume $ND = 0$ for the sake of simplicity. $cD = f(r_L^-)$, i.e., cD is a negative function of the interest rate[1] where c is the proportion of credit worthy borrowers and D is total debt-financed demand.

The second necessary equation to derive AD in $[y, P]$ is:

2. $i = g(P^+)$

This describes the central bank's monetary rule and associates an interest rate with a price level.

We can connect the goods market and financial markets with:

3. $cD \equiv C_D$

As a result, we obtain Figure II.

[1] Throughout the paper, $y = f(x^+)$ or $y = f(x^-)$ will denote the sign of the partial derivative $\frac{\partial y}{\partial x}$.

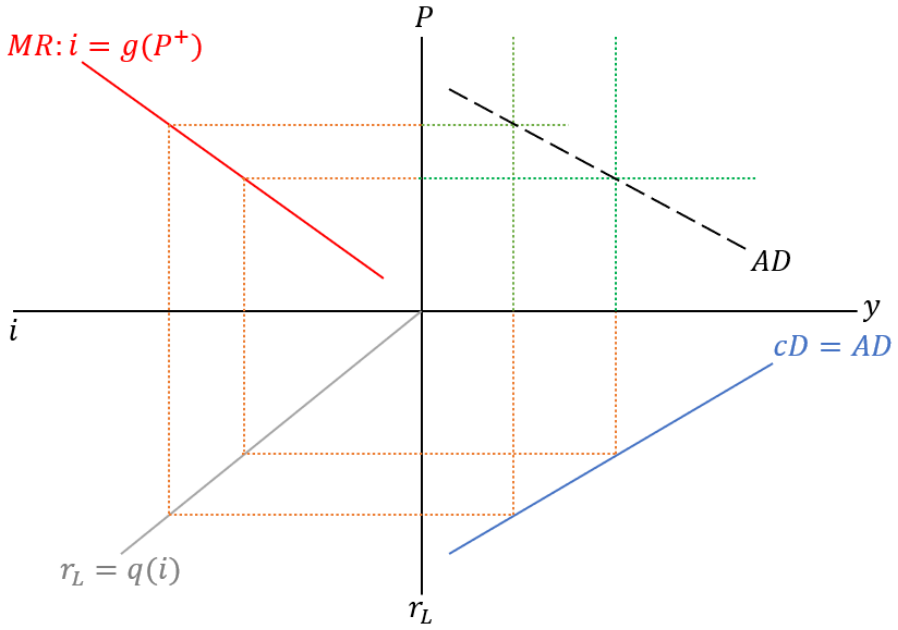

Figure II – author's recreation of Figure 8.2 from (Fontana & Setterfield, 2009, p. 151)

Aggregate supply in $[y, P]$ space is derived from firm pricing behaviour. Prices are equal to a mark-up set on average costs of production – labour is assumed as the only input cost.

4. $P = (1 + m)\left(\frac{WN}{Y}\right)$

$\frac{WN}{Y}$ is assumed fixed in the short-run due to contractual and productivity rigidities.

Combining AD and AS gives us Figure III. Equilibrium in the goods market gives us output Y out of a maximum of Y_L.

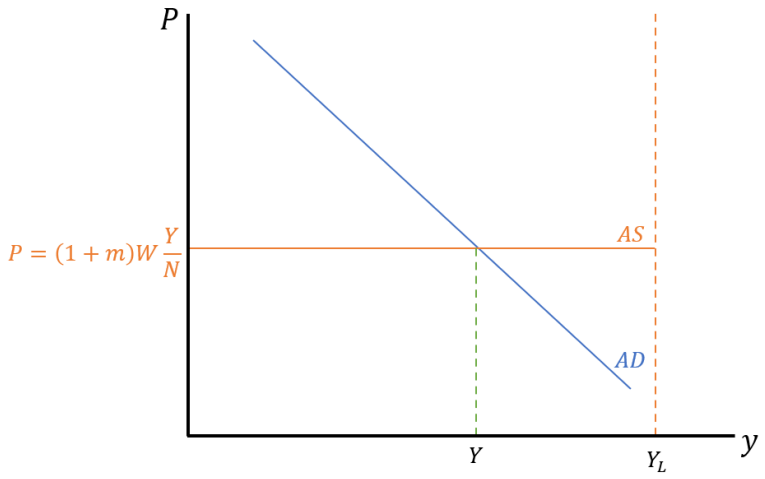

Figure III – author's recreation of Figure 8.5 from (Fontana & Setterfield, 2009, p. 153)

Production and Labour Markets

To find the level of labour employment given output, we use the aggregate production function which associates a level of output y with capital K and labour N. See Figure IV.

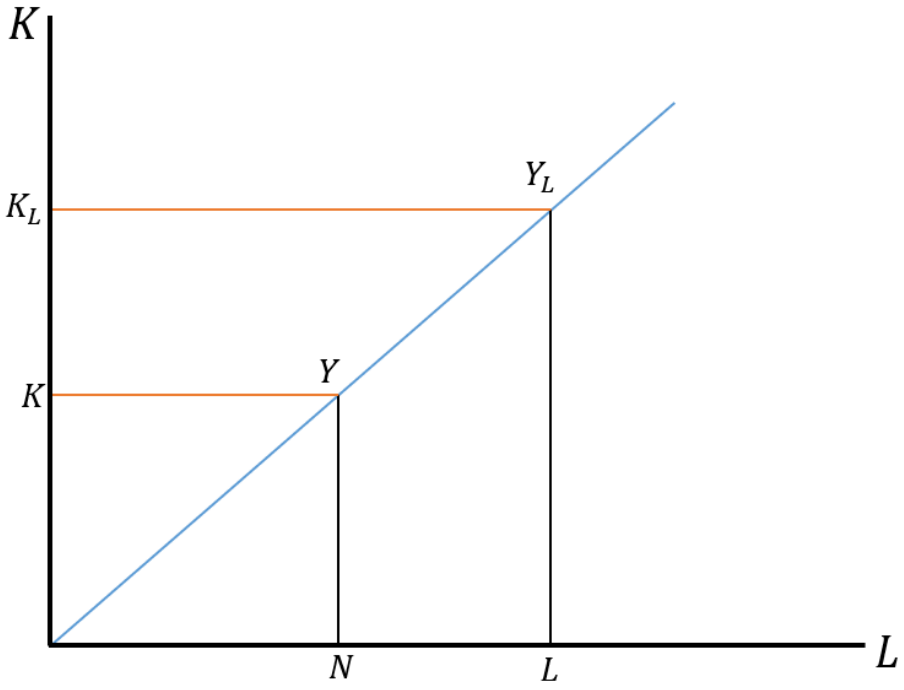

Figure IV – author's recreation of Figure 8.3 from (Fontana & Setterfield, 2009, p. 152)

The labour market is shown in Figure V.

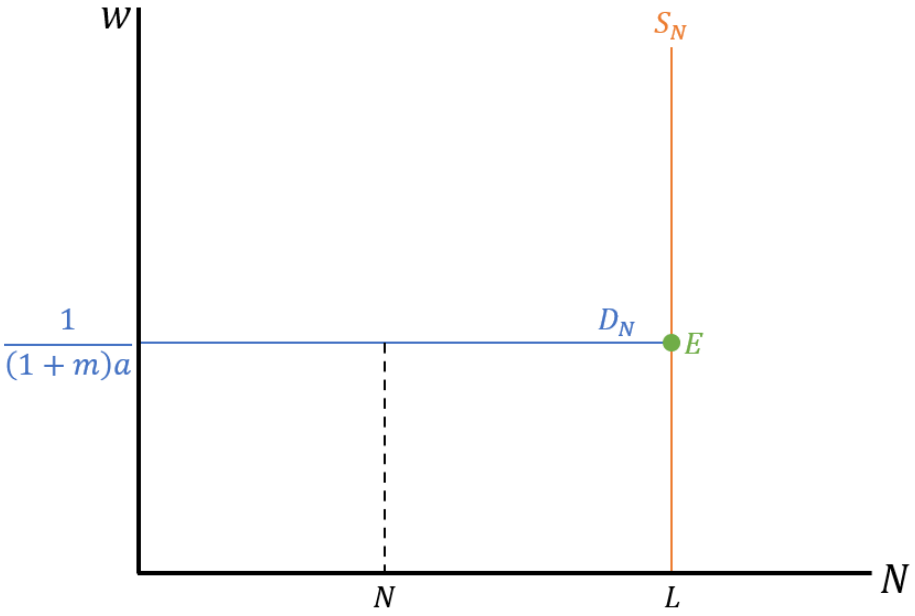

Figure V – author's recreation of Figure 8.7 from (Fontana & Setterfield, 2009, p. 155)

The labour supply is assumed to be perfectly inelastic, equal to the total active labour force L.

While the full employment equilibrium E would be reached if firms hired the full labour supply, the goods market equilibrium means employment is stuck at N – unemployment $U = L - N$.

The real wage is found by rearranging (4) into:

5. $\frac{W}{P} = \frac{1}{(1+m)a} = w$

Where $a = \frac{N}{Y}$.

Policy Implications

Structuralists and accommodationists

Initially, endogenous money theory was not focused specifically on the microeconomics of bank and central bank behaviour (Palley, 2001, p. 163). The accommodationist/structuralist split, though, led to debate over the slope of the credit and reserve supply curves, C_S and R_S

(Fontana, 2003, p. 293). Palley (1994, pp. 74-76) suggests the debate is really over whether the slope of these curves is dictated simply by a central bank response function (accommodationist), or banks' and borrowers' private behaviour, independent of the monetary authority (structuralists).

Accommodationists maintain that the best way to depict the C_S and R_S curves "remains a horizontal line, at the target overnight rate." (Lavoie, 2006, p. 23). Lavoie (*ibid*) argues that policy rate setting decisions are not inherently tied to levels of output, capacity utilisation, or any general rule at all – they are bureaucratic decisions and consequently the most we can know is that between periodical rate changes the central bank perfectly accommodates liquidity at the chosen rate: $R_S = i$. Commercial banks fully accommodate all credit demand at a given interest rate (Fontana [paraphrasing Moore (1988)]), 2003)

Structuralists including Dow (2006) and Palley (1994; 2001) argue that accommodationists have ignored Keynes' theory of liquidity preference (Dow, 2006, p. 43) and banks' endogenous liability and asset managing behaviour (Palley, 1994, p. 76; 2001, p. 170). Dow (2006, p. 45) argues that risk-perception adjusts at the macro-level via a Minsky process wherein successive over- or underwhelming profit expectations lead to falling (rising) liquidity preference from banks, shifting portfolios from (to) loans to (from) investments and thus raising (decreasing) interest rates on loans as a whole. Palley (1994, p. 75) argues that accommodationists take for granted the idea that economic agents will willingly hold demand deposits created from loans: assuming that agents switch portfolios between demand deposits and time deposits (which will have different reserve requirements), assets, and repayments, depending on interest rates, then banks will raise (lower) interest rates to secure the proportion of demand and time deposits needed to fully accommodate increased (decreased) loan demand.

Structuralists thus construct the following equations (adapted from Palley (1994, pp. 76-77)):

6. $r_L = (1 + \mu)i + \alpha(C)$
7. $LD(r_L, C)$

Dow's (2006) Minskyan argument also suggests that mark-ups are a negative function of changes in profit expectations:

8. $\mu = f\left(\frac{\partial E(\Pi)}{\partial t}\right)^-$

Thus, C_S could slope down in a boom but up in a bust (Dow, 2006, p. 45).

There is further debate amongst structuralists regarding (8). Palley (1994, p. 78) writes:

> "If the default risk rose with lending, then the aggregate loan supply schedule would be positively sloped for reasons totally unconnected with 'structural' endogeneity. […] It would also be sloped in the [accommodationist] model since the mark-up would rise with lending."

I agree with Palley that explicit focus on default risk when examining the structuralist viewpoint misses an analysis of the banking system's specific micro-behaviour for a more generalist Minskyan idea that economic agents experience co-varying levels of liquidity preference throughout the business cycle. In doing so, structuralists may ignore the more interesting (6) and (7) which complicate Figure I into Figure VI.

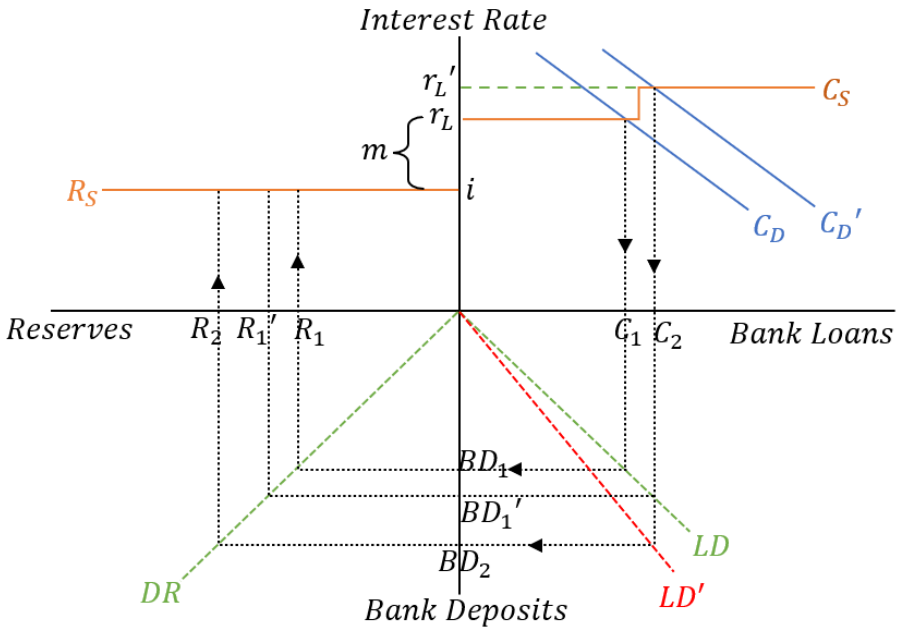

Figure VI – Reinterpretation of Figure I including Palley's equations

In the modified model, banks need to charge the higher interest rate r_L' because they must increase the loan multiplier, i.e., modify the LD schedule, allowing them to reallocate demand between demand and time deposits, accommodating the new loan demand C_D' (Palley, 2001, p. 171).

The difference in frameworks leads to conflicting policy implications. Due to a belief in the "scarcity of finance" (Dow, 2006, p. 45), structuralists generally accept that the rising credit supply curve implies government transfers will crowd out private investment to some degree. Palley (2001, p. 177) also suggests regulatory controls to restrict the loan expansion process shown in Figure VI. Accommodationists do not project crowding-out constraints on gov. transfers, with Lavoie (2006, pp. 26-27) arguing that, in fact, a downward-sloping LM curve arises from stock-flow consistent modelling.

General Policy Implications

The most important general policy implication of the EMM is that fiscal policy can be an effective tool for growth and stability, and should not be relegated to a budget-balancing

exercise. Fontana and Setterfield (2009) use the EMM to analyse two scenarios: a credit crunch and a reduction in nominal wages. I will examine only the first scenario in detail.

In a credit crunch, policy-makers should react to a credit crunch by boosting fiscal stimulus. This is because in the event of a downturn commercial banks tend to increase mark-ups either due to a shift factor (Lavoie, 2006), or a slope (Dow, 2006), kinking the stable relationship between r_L and i at i_t, which is the policy rate at the time of the crunch; see Figure VII.

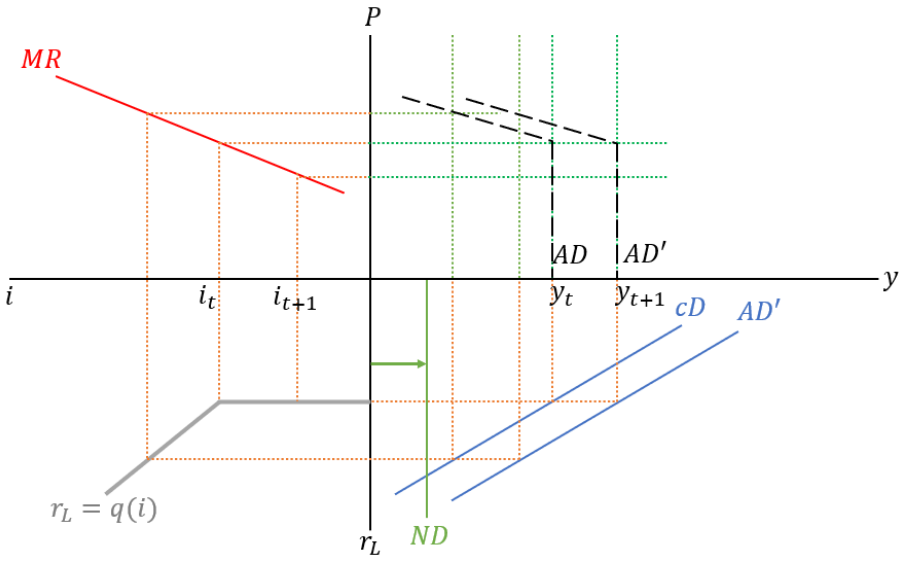

Figure VII – Updated Figure II to demonstrate weak transmission mechanism.

When the central bank decreases the policy rate from its current position to i_{t+1}, this has no effect on the market rate r_L, and no effect on AD: output stays at y_t. However, to re-anchor mark-ups, falling profit expectations must be reversed, which can only be done by increasing AD; therefore, fiscal stimulus is necessary and ND rises shifting $AD \rightarrow AD'$.

Using a structuralist framework adds some policy complications: if fiscal stimulus precipitously increases the market rate, there may be a policy conundrum, where extra demand is offset by increased rates; see Figure VIII.

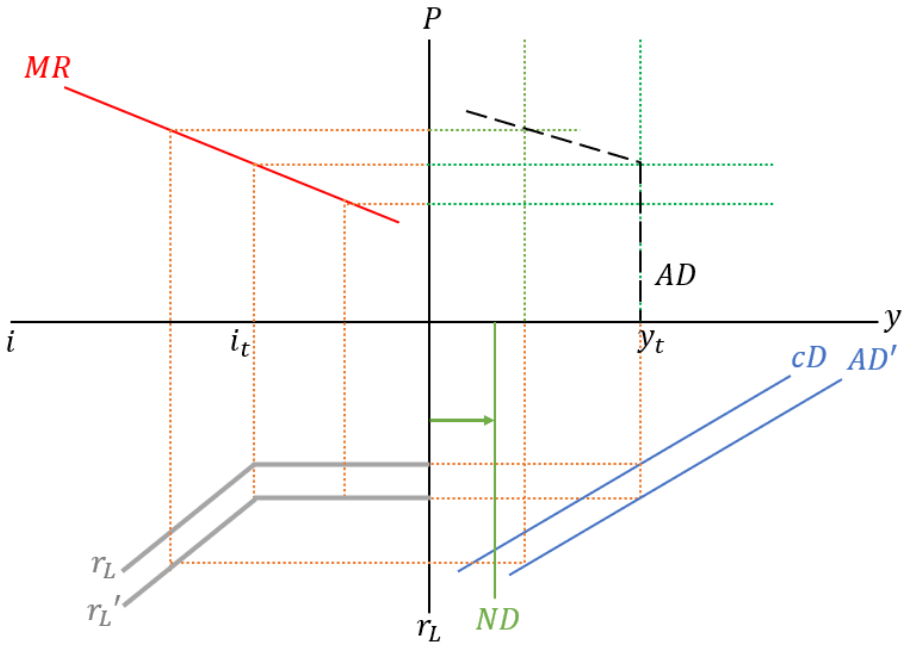

Figure VIII

As risk and profit expectations readjust, r_L' will re-anchor, unkinking and shifting up, however government stimulus may induce a higher rate of interest during the recovery period *ceteris paribus*.

In conclusion, the EMM model provides policy makers with a new perspective to analyse recessions and fiscal stimulus. In this paper I have outlined the EMM and introduced important equations and diagrams to connect financial, goods, and labour markets with output. I then outlined the conflicting policy implications originating from the structuralist/accommodationist split and finally ended with an analysis of a credit crunch through a structuralist framework, showing that an imperfectly elastic credit supply function could complicate fiscal stimulus programs.

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