

# AN INTELLECTUAL HISTORY OF MONEY ENDOGENEITY THEORY

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## I INTRODUCTION

The issue of whether money is an exogenous or endogenous variable has been a point of contention at least since the *Bullion Report* of 1810. In recent times, the reaction to Friedman's monetarism has again raised this debate to prominence. Widespread deregulation of financial systems and the failure of Friedman's monetarist policies have also added to the renewed interest. Post-Keynesian economists have been one of the groups most actively examining the issue, both theoretically and empirically. This paper outlines an intellectual history for modern post-Keynesian endogeneity theory.

Before commencing this intellectual history, however, money supply endogeneity must be defined. Causality is used in this paper to define endogeneity. This view is also taken by Desai, who has argued that "[t]he basic issue is about the direction of causality - money to other variables, or other variables to money" (1989:146). Thus if the money supply is exogenous, one or more of the main macroeconomic variables - the general price level, real output, or the interest rate - will be determined by changes in the money supply. On the other hand, if the money supply is endogenous then it is itself determined by one or more of the main macroeconomic variables (*ibid*). Of course, this definition leaves a number of questions open.

The most important question is how the money supply is defined. It has been variously defined as a "common medium of exchange", a "temporary abode of purchasing power", or as a "means of retiring debt". Each of these theoretical definitions lead in turn to further problems in practice, as it is often difficult to

identify a precise set of assets which match the theoretical characteristic. The result is often a series of categories defining money and "near-monies". Although this problem has plagued monetary theory throughout its history, the difficulty of defining money has special relevance to the endogeneity/exogeneity debate, because in theory a narrow definition might be considered *theoretically* exogenous even though a broad definition may be *theoretically* endogenous. Moreover, in examining the money creation process in order to support an endogenous or exogenous position, a theorist must decide which institutions are relevant. These institutions will be partly determined by the type of money permitted. The definition within the paper will vary depending on the economist being examined. Unless otherwise stated, though, a broad post-Keynesian definition applies; that is, money is anything that legally discharges a contractual liability under the civil law of contracts (Davidson, 1988:154).

Another question left open is the type of economy which is implicitly or explicitly under discussion. For example, in a modern credit-using economy, money is always both an asset and a liability and is therefore more likely to be created endogenously (Desai, 1989:150). Bank deposits are the bank's liability, but the depositor's asset, and can be created by the bank on demand in response to a loan request. This is in sharp contrast to an unsophisticated economy which uses commodity money. Since commodity money is always an asset without a corresponding liability, it is more likely to be exogenous. Indeed, those who assume an exogenous money supply in a sophisticated economy have been accused of imposing commodity money characteristics upon credit money (for example, see Rogers [1989:275], who so accuses Friedman).

Desai also raises the important question of control of exogenous variables (1989:146). Using Desai's example, rainfall is usually thought of as an exogenous variable, and yet it cannot be manipulated by policy. Since many of the participants in the debate use exogeneity and endogeneity in the control sense, this is a significant issue. It is particularly important in light of the use of statistical testing of theories, since it can involve a confusion between exogeneity in the control sense and exogeneity in the statistical sense. We should note that if exogeneity and endogeneity are defined via the control rather than the causality characteristic, the money supply may appear endogenous because of central bank manipulation of the money supply to meet interest rate targets. But this does not necessarily imply endogeneity in the causality sense in which the term is used in this paper: for this to be so, the money supply must be an effect rather than a cause.

## II INTELLECTUAL HISTORY

### (i) *Early Endogeneity Stories*

The concept of money supply endogeneity has a long history. In nineteenth century England, economists involved in the Bullionist and Banking-Currency School debates raised issues which are relevant to modern endogeneity theory. Of course, a fully developed theory of endogenous money did not arise from either of these debates. However, in foreshadowing the *Radcliffe Report* (to be discussed below) and the modern debate in some respects, they should be regarded as part of

the history of money supply endogeneity. The two debates will now be briefly explored.

Following a drain of bullion from the Bank of England and other banks as a result of the Napoleonic Wars, the convertibility of Bank of England notes was suspended in 1797. The suspension was followed by a rise in the paper price of commodities, gold bullion and foreign currencies (Humphrey, 1991:92). In 1808 a sudden drop in the exchanges led to the appointment of the Bullion Committee, their investigation culminating in the *Bullion Report* of 1810 (Santiago-Valiente, 1988:52). The Bullionists supported the resumption of specie payments, arguing that the inflation was due to the overissue of inconvertible Bank of England notes. However, Bullionists varied in their support for the quantity theory of money. Ricardo, for example, supported a "strict" application of the quantity theory, and further, he advocated control of the money stock through control of the monetary base.<sup>1</sup> Thornton on the other hand was more eclectic in his approach, and many of his qualifications to a strong statement of the quantity theory foreshadowed later unorthodox developments (Schumpeter, 1954:706). For example, he foreshadowed the variable velocity of Keynes' *General Theory* (1936) and, in recognising that all means of payments could be considered alike at a certain level of abstraction (Schumpeter, 1954:719), he anticipated the *Radcliffe Report*.<sup>2</sup>

The anti-Bullionists rejected the need for resumption of specie payments, and believed that the inflation could be attributed to real factors such as those related to the war with France. In their articulation of a supply-shock or cost push theory of inflation, they anticipated Kaldor (Humphrey, 1991:94). They also believed that an excess supply of money was an impossibility, since those who borrowed would not borrow more than they needed, and in any case, the loans were supported by real bills (Deane, 1978:48-9). This meant that the secured loans would be repaid once the goods which backed them were sold. Hence the causation is reversed in the equation of exchange,  $MV=PQ$ ; that is, money was being created along with goods.

The Banking-Currency School controversy followed the resumption of convertibility in 1821. The questions at issue were the stability of the exchanges and reform of the currency system. The Currency School believed that the automatic fluctuation of the note issue with gold, which fluctuated with the trade balance, was necessary for stability of domestic prices and the exchange rate. Unlike their predecessors, however, they did not believe that convertibility was sufficient to prevent an overissue of notes, and advocated strict regulation of the Bank of England note issue (Cramp, 1962:7-8). In contrast, the Banking School argued that no such regulation was required to reinforce convertibility and ensure stability.

The Banking School's most well-known advocate was Thomas Tooke, whose writings covered the period 1826 to 1844. Tooke argued that the amount of the medium of exchange in circulation depended largely upon final expenditures out of money income (Smith, 1991:14), rather than the reverse. His support of the commercial bill doctrine partly provided the foundations for this position. Banks only provided advances for the needs of trade (i.e. real bills), and then through the "law of reflux", the loans were repaid and the purchasing power eliminated.<sup>3</sup>

Indeed the law of reflux ensured that bank notes could not be overissued, because any notes not in use were either deposited with banks, returned as repayment of loans, or converted to coin. Since the rate at which bank notes were returned to banks was determined by the note holders, the quantity of debt which could be issued by banks was limited (Wray, 1990:107).<sup>4</sup> What then were the major determinants of the price level? Tooke made the usual classical distinction between market period (short run) prices and natural (long run) prices (see Smith, 1991:15-6). In Tooke's view, variations in the price level could ultimately be traced to changes in production conditions,<sup>5</sup> while in the short term the activities of speculators tended to amplify these changes (*ibid*:14). Any exogenous increase in the price level would lead to an expansion of credit instruments and bank deposits rather than an increase in notes and coin. Under Tooke's definition of money this constituted an increase in the money supply (Smith, 1991:11). In contrast, the Currency School defined money narrowly, so that this scenario would be interpreted as an increase in velocity.<sup>6</sup> Tooke further maintained that since all quantities could be purchased without recourse to (gold-backed) money,<sup>7</sup> and since not all money circulated, money was not a useful variable upon which to focus attention (Schumpeter, 1954:709).<sup>8</sup>

It is interesting to note that Karl Marx derived his views on money through a critical investigation of the Currency-Banking School debate (Wray, 1990:110; see *Capital*, Vol 3). Within a monetary theory of production model,<sup>9</sup> Marx followed the Banking School in arguing that the causation in the equation of exchange ran from PQ to MV.<sup>10</sup> Marx's view that the creation of credit is necessary to finance capitalist production means that Marx preceded Keynes (1936) in developing a monetary theory of production. Marx also believed that the banks had a flexible reserve requirement, and that credit could be created on demand. At the same time, however, he maintained that the supply of loans would contract if risks rose and confidence fell (Dow, 1985:198). This loss of confidence could be caused by unrealistic expectations on the part of producers, for example when overproduction became evident in some markets. Marx also believed that if a pyramid of credit had been built up for speculative purposes, a rush to liquidity by bankers could be caused by a revision of expectations of asset prices (*ibid*). In this, Marx preceded Minsky (discussed below). Finally, Marx believed that the actual amount of commodity money required to support the capitalist exchanges was very small, since it simply acted to make up the difference between credit given and received. In arguing that trade and other credit acted as near money, and hence as a medium of exchange (Wray, 1990:113), Marx foreshadowed the *Radcliffe Report*.

The insights of Thornton, the anti-Bullionists, the Banking School and Marx into the workings of an economy with a relatively important banking sector were not, however, influential enough to prevent the passing of the 1844 Bank Charter Act. The provisions of this Act embodied the belief that the credit money supply could be made to behave like a commodity money supply, and it overlooked the difficulty of defining money. However, financial crises of the type experienced in 1825 and 1836 recurred in 1847, 1857 and 1866, and Tooke's scathing assessment of the Act

appeared warranted when it was suspended in order to allow the Bank of England to provide the necessary liquidity during these crises.<sup>11</sup>

(ii) *The General Theory of Employment Interest and Money*

The ascendancy of the idea of an exogenous money supply continued into the twentieth century. Keynes (1936) himself accepted the exogeneity of the money supply, although his was one of the earliest monetary theories of production. Kaldor, for example, notes that one of the problems with the *General Theory* was Keynes' failure to recognise that rising economic activity led to an endogenous rise in the money supply (1983:12, see also Rogers, 1989:201). Moore similarly argued that "Keynes' fundamental mistake was his willingness to accept 'the quantity of money as determined by the action of the central bank' (JMK, 7, p.247)" (1988a:246). Yet Joan Robinson argued that Keynes only assumed exogeneity in order to give as much ground as possible to the orthodox school. In order to obtain a hearing, Keynes had no choice but to "accept the presumptions of his critics in order to explode them from within" (Robinson, 1970:507; 1971:82). In pointing out that Keynes had dropped his inclination towards the endogenous approach between the *Treatise on Money* (1930) and the *General Theory* (1936), Foster (1986), Moore (1988a), Rogers (1989) and Wray (1990) lend support to Robinson's view. It should also be noted that in his replies to his critics in 1937, where he introduced the finance motive and discussed the revolving fund of credit, Keynes seemed to move much closer to an endogenous money supply position (Keynes, 1937a&b).

Furthermore, some would argue that an exogenous money supply is inconsistent with Keynes' (1936) theory of the interest rate. Rogers claims that Keynes did not stress the conventional nature of the interest rate enough, implying that Keynes really had in mind an exogenous interest rate (1989:170).<sup>12</sup> Similarly, Moore says that "[i]t seems quite clear that in the *General Theory* Keynes intended that the long-run rate of interest ... be treated as a largely exogenous factor determined not by real forces but by expectations" (1988a:252). This interpretation of Keynes' theory of the interest rate has been contested by Kreisler (1991), who pointed out that because a change in the level of income will cause a change in transactions demand for money, which then causes a change in the rate of interest, the rate of interest cannot be purely exogenous. Further, he says that since Keynes clearly took the money supply to be exogenously determined by the monetary authority, the interest rate cannot also be exogenous (*ibid*:54). However, the debate about what Keynes really meant is beyond the scope of this paper.

Although the *General Theory* embodies an exogenous money supply, there are common elements between it and a post-Keynesian endogenous money supply theory. Most importantly perhaps is the conception of the economic system, which is in sharp contrast to that of orthodoxy. Orthodoxy assumes that the economy is self-stabilising at a full employment equilibrium. The 'axiom of reals' or the classical dichotomy means that money is neutral in the long run; that is, real variables determine the type and amount of goods produced and the real rates of exchange, while the nominal variable money determines the price level and therefore other nominal outcomes such as the nominal interest rate and nominal

wages. Keynes rejected the 'axiom of reals' and brought money to centre stage, such that "money enters into the economic scheme in an essential and peculiar manner" (Keynes, 1936:vii). For in a world where production takes place in historical and therefore irreversible time, and where only the past is known with certainty, money cannot simply be a medium of exchange. In other words, money does not exist because it is a more efficient method of exchange than barter. Rather, it exists both because it is necessary for the financing of production and because its possession "lulls our disquietitude" (Keynes, 1937c:116), that is, it is held as 'insurance' in the face of uncertainty. Indeed, money is so central in the *General Theory* that, "in the absence of money and in the absence - we must, of course, suppose - of any other commodity with the assumed characteristics of money, the rates of interest would only reach equilibrium when there is full employment" (Keynes, 1936:235).<sup>13</sup> Thus it is the existence of money, whether exogenous or not, which enables an unemployment equilibrium to occur.<sup>14</sup> In summary then, both Keynes (1936) and modern endogeneity theorists have a monetary theory of production, in contrast to orthodoxy which introduces money as an afterthought.<sup>15</sup>

The endogeneity theorists also share with Keynes (1936) a clear rejection of the traditional quantity theory of money approach. Within Keynes' (1936) framework, Say's Law is rejected and the level of income and employment is a function of the marginal efficiency of capital, the marginal propensity to consume and the interest rate. In the presence of unemployment, an increase in planned investment or any other autonomous expenditure will raise the level of economic activity and savings without an increase in the money supply. The higher level of economic activity is "financed" by a rise in velocity, as idle balances (which have no turnover) are transformed into active balances (which have a positive turnover). The mechanism which induces this transformation is the higher interest rate which accompanies the sale of bonds to acquire transaction balances. Thus, once PQ increases, the equality of the equation of exchange is met through an increase in V, and hence the direction of causation is from right to left, that is, from activity to MV. On the other hand, if the initiating factor is on the left hand side of the equation of exchange, that is if money is exogenously increased, the right hand side will not necessarily increase equi-proportionately. As an exogenous increase in the money supply is partly fed into idle balances due to a fall in the interest rate, and since idle balances do not turn over, the velocity of money falls.

Thus, while Keynes (1936) did incorporate an exogenous money supply into his model, the *General Theory* nevertheless made an empty shell of the traditional quantity theory of money.<sup>16</sup> Indeed, in so doing, Keynes (1936) developed an endogeneity theory of sorts. But rather than endogenising the entire money supply, he endogenised only transactions balances. In both cases, rising economic activity can be financed. But it should be noted that in Keynes' (1936) model, the exogenous supply of total money limits the extent to which the supply of transactions balances, which is drawn from idle balances, can increase in response to an increase in the demand for them.

### (iii) *The 1950s and the Radcliffe Report*

The neoclassical synthesis, which is alleged to be a representation of Keynes' (1936) insights, was developed and refined throughout the 1940s and 1950s. It has its origins in Hicks' 1937 depiction of Keynes' *General Theory* (1936), which employed the now familiar IS-LM framework. It was then developed and popularised by economists such as Modigliani (1944), Hansen (1949) and Patinkin (1956).<sup>17</sup> The textbook representation of Keynes which followed this development reduced a major conclusion of the *General Theory* - that the economy was not self-stabilising at full employment - to a series of special cases. These were the liquidity trap, the inelasticity of the investment schedule, and rigidity of nominal wages.<sup>18</sup> But most importantly for this survey, this approach shares with Keynes the assumption of an exogenous money supply. Unlike Keynes, though, the neoclassical synthesis led back to the classical dichotomy and the long-run neutrality of money through a real balance effect.<sup>19</sup>

The new orthodoxy, however, was not accepted in every quarter. The *Radcliffe Report* (Radcliffe, 1959), for instance, contained elements of an alternative view. It was commissioned in response to a perception that monetary policy was not capable of controlling spending, and it took evidence from a range of business, government and academic witnesses over a two year period (Rousseas, 1985). Of the economists involved, Kaldor and Sayers were reported to have been particularly influential in the final conclusions made in the *Report* (Wray, 1990:152).<sup>20</sup>

According to Anna Schwartz, the *Radcliffe Report* "enshrined what had come to be conventional wisdom during the preceding quarter of a century, namely that monetary policy is unimportant" (1969:1). Another critic, Harry Johnson, claimed that the *Report* represented the "high tide of Keynesian scepticism about the importance of monetary policy and the relevance of monetary theory" (1972:21). These comments, which imply that the Radcliffe committee had moved no further than the traditional "Keynesian" liquidity trap explanation, miss what others have seen as the essential conclusion of the *Report*. That is, since the fulfillment of spending plans depends on total liquidity, monetary policy directed only at the clearing banks is generally ineffective in controlling such spending.

The committee concluded that "spending is not limited by the amount of money in existence; but it is related to the amount of money people think they can get hold of, whether by receipts of income ..., by disposal of capital assets or by borrowing" (Radcliffe, 1959:133). This reasoning led the committee to reject a monetary growth rule, saying that (narrowly defined) money is only part of the wider structure of liquidity in the economy, and it is this wider structure which is relevant to spending decisions. They recognised that even wide-ranging control of the financial system would be subject to continual slippage as new financial institutions developed to avoid the controls (*ibid*:132-4). In addition to the growth of non-bank financial intermediaries (NBFIs) at the expense of the clearing banks,<sup>21</sup> narrowly defined velocity could also increase because of the Keynesian (1936) mechanism of drawing on idle balances, or because of innovations.<sup>22</sup> Hence, the committee concluded that (narrowly defined) velocity was, for all practical purposes, unlimited

(Radcliffe, 1959:133). Rousseas notes that the implications of this statement were not fully realised by the committee, as it went beyond Keynes' (1936) analysis, in which velocity has an upper limit, given by the quantity of idle balances. Nevertheless, the *Report* is cited by post-Keynesians as an important part of their intellectual history, since, as Rousseas states, "[t]he British economists who gave testimony had most of the basic elements of contemporary Post Keynesian economics in place" (1986:100).

However, as Rousseas also explains, "the Radcliffe committee, traumatized by its findings, had a failure of nerve and embraced one of the major arguments of the American availability of credit doctrine" (1985:51).<sup>23</sup> In discussing the use of monetary policy to reduce demand, the committee dismissed the demand side (cost of borrowing) effect as less important than the supply side (availability of credit) effect of an increase in the interest rate. By reducing the availability of finance through the locking in effect, an increase in the interest rate would reduce demand pressure, since, "if the money for financing the project cannot be got on any tolerable terms at all, that is the end of the matter" (Radcliffe, 1959:131). Hence the committee believed that liquidity, if not the money supply, could be controlled.

The committee's 'failure of nerve' also meant that some of the more unorthodox submissions were not included, or at least not stressed, in the final *Report*. In Kahn's submission, for example, it was argued that inflation was caused in the wage negotiation process: "[t]he normal situation is .... one in which the behaviour of prices is determined by the course of wage negotiations, so that any progressive rise in prices is a 'cost inflation' -if the term has to be used" (Kahn, 1959:138).<sup>24</sup> Hence prices are not determined by MV; the right to left causality in the quantity equation  $MV=PQ$  is reinforced; and inflation should be controlled in the "realm of wage negotiations", rather than by monetary policy (*ibid*:140).

Even though the *Report* "was before its time and .... reaped the hostility of those unwilling to give up on the notion of the money supply as the key exogenous variable in monetary policy" (Rousseas, 1985:51), it did not stand alone. Other unorthodox monetary statements were being made in the 1950s. An institutional approach was taken by Gurley and Shaw (1955; 1960) and, to a greater extent, by Hyman Minsky (1957a&b). Their work pointed to the problems of implementing a tight monetary policy in the face of an evolving institutional structure. Each will now be discussed.

Gurley and Shaw (1955) described how tight controls on the trading bank sector led to the growth of NBFIs.<sup>25</sup> Even if the money supply is fixed exogenously by the authorities at some level, availability of "near-money" meant that the velocity of narrow money would rise to facilitate an increase in economic activity. This idea therefore pre-dated the Radcliffe findings.<sup>26</sup> They argued also that large non-financial corporations would start to take on a banking role in response to tight monetary policy.

Minsky's "financial instability hypothesis"<sup>27</sup> is very much integrated into current post-Keynesian exegesis.<sup>28</sup> One of the key characteristics of the hypothesis is the portrayal of the financial sector as responsive to the demands of private industry. In other words, the financial sector is endogenised and causation is from right to left in

the quantity equation  $MV=PQ$ . In the mid-1950s Minsky warned of the dangers of ignoring institutional changes which were responses by the financial system to profit opportunities (1957a). Profit opportunities (indicated by high interest rates) were likely to result from "[c]entral bank constraint upon commercial bank reserves during a period diagnosed as inflationary ... due to a belief that any increase of bank loans would feed inflation" (1957a:171). Minsky noted that two contemporary innovations, the development of the federal funds market and the financing of government bond houses by non-financial corporations, were increasing the amount of lending that could be supported by a given volume of reserves.<sup>29</sup> Minsky related these changes to the velocity function, which shifts with the innovations, and which "represents a permanent increase in lending ability" (1957a:172).<sup>30</sup>

In urging the central bank to relinquish the unfounded idea that it could reduce inflation, and accept its lender of last resort responsibilities with respect to new and established institutions and financial assets (1957a:174-6), Minsky came very close to a money supply endogeneity story. Minsky realised that the Federal Reserve had been operating as a lender of last resort, but wished to see it accept a wider definition of this responsibility. Elsewhere, Minsky made clear that the central bank could choose between various monetary system scenarios, one being complete accommodation (1957b). In his words, "an infinitely elastic money supply can be achieved by a central bank lending to commercial banks, or by a central bank purchasing open market paper" (*ibid*:235). But it is clear that Minsky was at this time prescribing accommodation rather than acknowledging its presence, and for this reason did not have a true money supply endogeneity theory.

It is also apparent that Minsky's (1957a) analysis anticipated the findings of the *Radcliffe Report*. But because it incorporated changes in velocity within a dynamic model of a capitalist economy, where money market innovations increase the fragility of the system (Minsky, 1957a:50), Minsky came to very different conclusions from those reached by the Radcliffe committee. In particular, the committee concluded that total liquidity, if not narrow monetary aggregates, could be controlled from the supply side via the locking in effect. By contrast, under the Minsky scenario, no supply side control mechanism would be effective for any length of time. The system would always evolve to avoid the consequences of central bank action.

To conclude this section, those aspects of the above works which are closely related to an endogenous money supply theory will be highlighted. It is essential to recognise that it is a very short step from a passive velocity to a passive money supply. Firstly, all the approaches entail the same direction of causation; from economic activity to the financing of that activity. Secondly, unlike Keynes' (1936) explanation, where velocity rises because of the activation of idle balances, in these works velocity rises because the entire financial system is endogenised. Thirdly, rising velocity due to innovations could be interpreted as a rising money supply, if money is broadly instead of narrowly defined. Fourthly, the efficacy of contractionary monetary policy is questioned, since it is likely to spark endogenous changes in the financial system. On a related point, some of the above works

stressed the wage setting process as the cause of inflation, and hence reinforced the right to left causation.

#### (iv) *Post-Radcliffe Report and the Chicago Counter-Revolution*

Even though the idea of an exogenous money supply was already firmly entrenched in the text-books by the 1950s, the rise of Friedman's Chicago school and its growing dominance meant that those building on the post-Keynesian elements of the *Radcliffe Report* had little chance of being widely influential.

An exogenous money supply was of course essential to Friedman's (1956) restatement of the quantity theory of money as a theory of the demand for money. The restatement used a portfolio approach, where individuals decide how to distribute their wealth in order to maximise utility (1956:53). That is, individuals equate the marginal utility of the last dollar held in each form of wealth, one of these forms being money. Money demand can therefore be written as a function of total wealth, the market prices of and the return to alternative forms of wealth, the degree of substitutability between wealth assets, and preferences (*ibid*:52). Friedman argued that permanent income is a proxy for total wealth, and that individuals demand to hold a proportion  $k$  of their wealth as money:

$$Md = k(r_i, Wh, P, p, U).Yp \quad (1)$$

where

$Md$  = nominal money demand;

$r_i$  = rates of return on various assets, such as bonds and equities;

$Wh$  = ratio of human to non-human wealth;

$P$  = price level;

$p$  = expected rate of change of prices;

$U$  = tastes;

$Yp$  = permanent income.

The proportion  $k$  is not a constant, rather it is a function of the rates of return on other forms of wealth, the ratio of human to non-human wealth, the opportunity cost of money (the price level), the expected inflation rate and tastes. Equation 1 can be rewritten by setting the demand for money equal to the supply of money, ie by assuming equilibrium:

$$Ms = k( . ).Yp \quad (2)$$

where  $Ms$  = nominal money supply.

If both sides are divided through by  $Yp$ , we have:

$$Ms/Yp = k( . ) \quad (3)$$

Since  $Ms/Yp$  is the inverse of velocity, we can rewrite (3) as:

$$Ms/Yp = 1/V( . ) \quad (4)$$

Rearranging (4) yields the equation of exchange (*ibid*:54-8):

$$Ms.V( . ) = Yp \quad (5)$$

This equation of exchange is transformed into a restatement of the quantity theory of money by noting that velocity is a stable function of the variables  $r_i$ ,  $Wh$ ,  $P$ ,  $p$  and  $U$ , and these variables are either relatively unchanging or they are highly inelastic with respect to money demand. Thus although velocity is not a constant, as in the traditional theory, the direction of causation is from left to right, ie exogenous

changes in the money supply cause changes in nominal (permanent) income. The restatement was completed in 1968 when Friedman discussed the short and long run effects of money on output and prices, using the expectations-augmented Phillips Curve. For, as Minsky notes, Friedman and others have adopted various expedients to achieve transitory non-neutrality of money even as they assert that money is neutral in the long run (1986b:113).<sup>31</sup>

Friedman (1964) had admitted that there was a two-way causality between money and economic activity. He claimed however, that "[t]he question at issue is, therefore, whether money exerts an important independent influence, not whether it is the only source of business fluctuations, and itself wholly independent of them" (1970:53). Nevertheless, using econometric techniques, Friedman confirmed the domination of the left to right causality. Friedman's followers, too, claim empirical support for one-way causality. For example, Schwartz has said that despite the possibility of the relationship between money and nominal income being explained in other ways, "[t]here is much statistical evidence suggesting that they do not, in fact, account for the observed results" (1969:7).

Friedman's claims of empirical support (eg Friedman, 1959; Friedman & Meiselman, 1963; Friedman & Schwartz, 1963 and 1982) have been subjected to criticism on econometric grounds (for example, see Desai, 1981; Hendry & Ericsson, 1983 and 1991; Dising, 1985; and Hirsch & de Marchi, 1986), as well as theoretical grounds. Friedman has responded to criticism (eg Friedman & Schwartz, 1991), but continues to support the left to right causality in the equation of exchange. Some of Friedman's early theoretical critics will now be discussed.

#### (v) *Post-Keynesian Response to Friedman*

Prior to the 1970s post-Keynesians had not explicitly or systematically integrated financial considerations into their view of the workings of capitalism.<sup>32</sup> Lavoie attributes this to their focus on growth models (1984:772). The popularity of Friedman's model however, provided the impetus for the theoretical development of post-Keynesian monetary economics. Several articles which appeared in the early 1970s were in direct response to Friedman.

Most of these articles showed that the empirically "verified" relationship upon which Friedman relied so heavily, that is, the leading relationship of money to income, is consistent with causality going from right to left in the equation of exchange. In other words, they rejected Friedman's *post hoc ergo propter hoc* analysis (for example, Tobin, 1970, Robinson, 1970:510, Kaldor, 1970:10). They argued that an increase in the planned level of output leads to an increase in the demand for credit on the part of firms. This credit is obtained from the financial system, and subsequently used to pay wages and other input costs. Since the increase in final output follows this process, causation can be wrongly attributed to the change in the money supply. Davidson and Weintraub (1973) added to this argument by distinguishing between automatic accommodation by the central bank, and accommodation to keep asset markets "orderly". In the first case, the growth in the money supply precedes that of activity, as described above. In the second case, the money supply does not rise until economic activity and the rising transactions

demand for money disturbs asset markets. In both cases causality is from right to left. Thus unilateral causality cannot be determined by leads and lags in time series data (1973:1117-9).

These early articles also took issue with Friedman on a number of other technical points. For example, Kaldor argued that for the monetary authority to be able to control the money supply via the monetary base, there has to be demand for loans. He explained the failure of the money supply to increase in the Great Depression, despite a rise in the monetary base, as due to a deficiency in loan demand. This explanation, Kaldor argued, refutes Friedman's claim that the depression was caused by irresponsible actions of the Federal Reserve.<sup>33</sup> Kaldor also attributes the stability of velocity to simultaneous increases in money supply and economic activity, and not to the stability of money demand. If the money supply had been held fixed, velocity would have been unstable (Kaldor, 1970:8-15).<sup>34</sup>

The response to Friedman also led to the first systematic outlines of the endogeneity position. For example, Kaldor said that because money is made up of "those forms of financial claims which are commonly used as a means of clearing debts", any attempt to control notes and coins on the part of the monetary authorities would lead to a rise in money substitutes, such as credit cards and promissory notes. These would be issued by the larger firms and circulate alongside bank notes. Therefore "any shortage of commonly-used types is bound to lead to the emergence of new types; indeed this is how, historically, first bank notes and then chequeing accounts emerged" (1970:7). Thus, "[w]hen the central bank succeeds in controlling the quantity of 'conventional money', lending and borrowing is diverted to other sources, and the 'velocity of circulation' in terms of conventional [narrowly defined] money, is automatically speeded up". Kaldor also described endogeneity as being caused by central bank accommodation, either to maintain full employment or to ensure stability in asset markets. This in turn means the interest rate is exogenously determined, so that, "barring helicopters, etc., the 'excess supply' [of money] could never materialize" (*ibid*:8-9).<sup>35 36</sup>

Davidson and Weintraub's (1973) arguments for endogeneity must be distinguished from those presented by Kaldor, as they allowed for the possibility of exogenous increases in the supply of money affecting output via the traditional Keynesian (1936) mechanism (that is, through interest rate changes). They denied, however, an effect of money on prices. Using a mark-up model, they argued that the growth of the price level is largely determined by exogenous changes in nominal wages in excess of productivity growth. There may be some causal effect of money on prices, but only indirectly through the effects of output changes on productivity.<sup>37</sup> Thus, if the central bank is accommodating a given level of output in a time of rising prices, "money is properly interpreted as being an effect of the higher price level, required to stabilise the real  $Q$ ,  $N$  and  $r$  variables [where  $Q$  is real output,  $N$  is employment and  $r$  is the real interest rate]" (1973:1130). Only that part of the increase in the money supply which is greater than the increase in the price level may be regarded as having a potential independent influence on economic activity (*ibid*).

Davidson (1972; 1974) continued the attack on Friedman's monetary framework. He claimed that Friedman's analysis failed to consider several issues deriving from the *General Theory* (1936) and the discussion which followed it, which have since become important elements of modern endogeneity theory. Specifically, Davidson accused Friedman of ignoring uncertainty and the fact that certain institutional features of capitalism exist because of this uncertainty, such as legally binding money contracts and sticky money wages. Because the future is unknown, the Walrasian auctioneer and price flexibility are institutions which are incompatible with the real world, and are unsuitable even for defining an abstract "norm" or trend. Furthermore, there is no need for money as a temporary abode of purchasing power in the face of certainty, and the other function of money, that of medium of exchange, is not required during the Walrasian auction. Thus in Friedman's world money is largely inessential, and only required to satisfy equilibrium contracts at the end of every period (Davidson, 1974:90-2).

As in Weintraub and Davidson (1973), Davidson (1974) also challenged Friedman by implying a two-way causality in the equation of exchange. He calls the right to left causality the income-generating finance process, while the left to right causality is the portfolio change process (1974:101-2). The income-generating finance process reintroduces the finance motive and the revolving fund of credit (see Keynes, 1937b:219-20), the existence of which means that an increase in planned (*ex ante*) activity will endogenously raise the money supply (Davidson, 1974:103,107). The portfolio change process occurs when the banking system offers private bank-debt contracts (deposits) as an alternative store of value to other assets at a favourable rate of exchange. Friedman's direct transmission mechanism arises from these portfolio rearrangements. But Davidson points out that for money to be a store of value, it must possess the following properties: a zero elasticity of production, a zero or negligible elasticity of substitution between money and any other good which has a high elasticity of production,<sup>38</sup> and zero cost of transferring money from the medium of exchange function to the store of value function. Because there is a zero elasticity between money as a store of value and goods, and because the substitution of securities for deposits is simply a portfolio rearrangement amongst assets which serve as stores of value, Friedman's direct transmission mechanism is negated. That is, there is no excess holding of money which will spill over into demand for commodities. Thus an open market operation can only have an indirect effect through the Keynesian (1936) interest rate mechanism (*ibid*:100-5).

### III CONCLUSION

This paper has discussed some of the many early contributors to modern endogeneity theory. It has established that money supply endogeneity has a long history, and that while this view has never dominated the discipline's approach, it has offered a consistent critique. Three themes recurred in this history of unorthodox thought:

(i) The idea that money is an effect rather than a cause. This is reflected in the right to left causality in the equation of exchange, and has several corollaries:

money is demand determined and therefore cannot be in excess supply, inflation is not caused by growth in the money supply but rather by growth in money wages and other costs, and lastly, the statistics which reflect the left to right causality in the equation of exchange are not useful indicators of causality.

(ii) The endogeneity of the money supply was usually reflected in the "effective"<sup>39</sup> rather than the actual money supply used in the theory, so that it was (narrowly defined) velocity which was endogenised. For example, while Tooke argued that bank deposits were money, he recognised that under the Currency School definition of money, it was the velocity of money which rose whenever bank deposits rose. For Keynes, on the other hand, velocity increased because of the distinction between idle and active balances. Finally, the Radcliffe committee, Gurley and Shaw, and Minsky noted that velocity increased whenever NBFIs satisfied credit demands or other institutional changes took place.

(iii) A belief that production is monetarised, meaning that money is essential and enters the economy during normal economic processes. This is reflected in the law of reflux as well as being an essential aspect of the theories of Marx and Keynes.

These themes were resurrected in the early 1970s by those who responded to the increasing threat of Friedman's monetarism. They were also incorporated within the more systematic development of post-Keynesian monetary theory, which occurred from the late 1970s. Contributors to that development are post-Keynesian monetary theorists such as Marc Lavoie (1984), Stephen Rousseas (1986), Paul Davidson (1988), Sheila Dow (1988), Basil Moore (1988), and L.Randall Wray (1990).

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## NOTES

- 1 Ricardo believed that expansions and contractions of Bank of England notes would be followed by the same changes in the supply of country bank notes (Humphrey, 1991:93).
- 2 Thornton nevertheless believed that convertibility was necessary to restrain the expansion of credit when the market interest rate was below the rate of return on capital (Schumpeter, 1954:722). In this respect, Thornton foreshadowed Wicksell.
- 3 The law of reflux can be explained using an example. Person A produces and sells goods to B. A draws a bill on B for payment. A discounts the bill at a bank, and uses the money for current production. B sells the commodities bought from A and uses the money to redeem the bill (Schumpeter, 1954:730). This is analogous to the idea of a revolving fund of credit, as discussed by Keynes (1937b).
- 4 An exception was government paper money, which was not subject to the law of reflux and therefore could be (exogenously) over-issued and cause inflation. This was because government debt represented additional demand, but need never be retired (Wray, 1990:107).
- 5 Supply conditions refer to the cost of production, the average agricultural productivity with average seasonal condition, and the level of the rate of interest (Smith, 1991:22). Tooke argued that high interest rate/tight money policies were inflationary because they raised the interest component of business costs (Humphrey, 1991:98).

- 6 The Currency School definition of money excluded bank deposits as well as instruments such as bills of exchange (Cramp, 1962:9).
- 7 A single bill of exchange, for example, was often used to make multiple payments at that time (Cramp, 1962:10).
- 8 Tooke's analysis is more complex than has been suggested by this brief exposition. For an interesting discussion of Tooke's analysis and its influence on later writers such as Wicksell, see Smith (1991).
- 9 In Marx's system, the money capitalist lends funds to the industrial capitalist, who then produces goods to obtain money in order to retire the debt. In other words, Marx had a monetary production model similar to that of Keynes and post-Keynesians.
- 10 It should be noted however that Marx did not follow Tooke and the Banking School on all issues. For example, Tooke implicitly assumed that all bank credit was extended on the basis of existing capital, and so facilitated circulation. In this way, no additional demand was represented by bank credit, and bank notes could not be inflationary. Marx on the other hand recognised that bank credit may be used to increase production, that is, it may represent additional demand (Wray, 1990:114).
- 11 Another pre-Keynesian economist who could be considered as an endogeneity theorist is Wicksell. Wicksell's examination of the special case of a pure credit money economy, in which the money supply is endogenously determined, led Cottrell to claim Wicksell's analysis as an antecedent of modern endogeneity theory (1986:3-4). Post-Keynesians such as Rousseas (1986) and Moore (1988a) have also cited Wicksell in this light. However, a closer examination of this model reveals its neoclassical foundation. Briefly, in the absence of a commodity money base, loans are demand determined and hence money is endogenously created when the money rate of interest is below the "natural" rate of interest. The money rate is determined in the loanable funds market, while the natural rate of interest, or the marginal productivity of capital at full employment, is determined by the forces of productivity and thrift in the market for "real" capital. Yet because it is the relationship between the money rate and the natural rate of interest that is driving the expansion of loans and the money supply, Wicksell cannot be said to be in the post-Keynesian tradition. A full discussion of Wicksell's monetary analysis can be found in Rogers (1989).
- 12 At least, this is Kreisler's (1991:54) interpretation of what Rogers (1989) is saying. However, it is unclear whether Rogers is claiming that Keynes actually had an exogenous interest rate, or whether he is saying that Keynes should have had one.
- 13 It should be noted that Keynes' use of the term equilibrium denotes a state of rest rather than the orthodox interpretation of market clearing.
- 14 In Keynes' (1936) model the money rate of interest determines the marginal efficiency of investment, and there is no mechanism which forces the money rate of interest to the rate which would generate the full employment level of investment. Even after making the implausible assumption of flexible wages and prices, and considering what is now called the Keynes effect, Keynes did not believe that the economy would necessarily move to full employment (*ibid*:266-7).
- 15 For example, Hahn has said the following about Walrasian general equilibrium theory: "[t]he 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" (1982:1).
- 16 Rousseas argues that Keynes, while not denying the link between M and Y, rejected the strength and stability of that link: "Keynes, in other words, never fully broke with the quantity theory of money" (1986:66).

- 17 While these authors used different theoretical underpinnings (both Walrasian and Marshallian), from a post-Keynesian point of view, they are sufficiently alike to be grouped together.
- 18 However, a re-reading of Chapter 19 of the *General Theory* (1936) shows that Keynes himself did not hold this text-book position. The liquidity trap was of passing interest to Keynes and was really an intellectual exercise which may only be important in highly unusual conditions. The investment schedule, on the other hand, was far more a function of expectations than the interest rate in the real world. Finally, Keynes believed that unemployment was likely to exist even when wages and prices were flexible. On this last point, Brown (1991) has contributed an interesting discussion. She argues that through a misperception of the implications of his own work, Keynes passed up an opportunity to question the inverse relation between a fixed demand for labour curve and real wages. Indeed it was Pigou who argued that the inverse relation between employment and real wages could be explained by the effect of demand shifts on employment, in this instance being "more 'Keynesian' than Keynes" (*ibid*:454).
- 19 Presley (1986) has used documentary evidence to show that it was Keynes who, in the 1920's, encouraged Robertson to depart from other neoclassical economists of the time by emphasising the real balance effect. Even by 1930, however, when the *Treatise* was published, Keynes had reached the conclusion that the real balance effect was an insignificant issue in practice. Presley concludes that this was also Keynes' view when he wrote the *General Theory* (1936).
- 20 Kaldor, as well as Brown, Harrod, Hicks, Johnson and Kahn were witnesses. Professor Sayers was a committee member.
- 21 This process of disintermediation reflects the movement of unsatisfied demand for credit from the controlled to the uncontrolled financial sector.
- 22 Innovations, unless otherwise specified, refer to the development of new financial instruments which facilitate spending. This is to be differentiated from technical innovations, such as automatic teller machines (ATMs) and the electronic funds transfer point of sale system (EFTPOS), both of which are an important explanation for declining currency growth in the late 1980's in Australia (*Indecs*, 1990:142). Another form of innovation is structural, such as the development of new financial intermediaries.
- 23 The major argument accepted by the committee was the "locking in effect", which was the effect upon holders of government debt (most importantly, the portfolio managers of NBFIs) of an increase in the interest rate. These holders would be "locked in" to holding the debt due to their "strong aversion" to potential capital losses (Rousseas, 1985:49). Further, this reduction in the liquidity of the portfolios of the bond-holding intermediaries tended to induce them to buy more government securities, possibly of shorter maturity (Gurley & Shaw, 1955:538). This made the interest rate a proxy for the supply-side effects of open market operations. Thus it provided a way in which total liquidity could be controlled (Rousseas, 1985:49).
- 24 Of course, the catalyst for cost inflation is not limited to nominal wage growth, but rather applies to increases in any of the elements of costs, including raw materials, the prices of which may be affected by exchange rate depreciations, and profit margins.
- 25 This was the case in Australia as well as the US, with the assets of Australian banks declining from 58% of total assets of the financial sector in 1953 to 42% in 1972 (Crean, 1974:110).
- 26 Like the Radcliffe committee, Gurley and Shaw supported the credit availability doctrine as a way of understanding the implementation of financial control, as distinct from monetary control (1955:538).

- 27 This term was not coined until the 1970's, but many of the essential elements were present in Minsky's early work.
- 28 Post-Keynesians see their theoretical roots perhaps as much in Kalecki as in Keynes. For example, Eichner has said that "post-Keynesian theory must be described as marrying Keynes with Harrod and Kalecki" (Eichner, 1985:114). Minsky's early use of Kalecki's work places him in the post-Keynesian school.
- 29 Both of these innovations occurred in the 1950's in response to high interest rates (1957a:163-4). (1) The Federal funds market deals in the reserve assets as specified by the Federal Reserve Bank. Banks with excess reserves provide them as unsecured loans to banks with a shortfall in required reserve assets (*ibid*:164-6). (2) The sale of government debt by a government bond house to a non-financial corporation effectively took the form of a "collateral loan callable both ways" (*ibid*:166). In 1956, the high interest rate structure meant that non-financial corporations became an increasingly important source of funds with which bond houses financed their positions in government securities. There was an incentive for bond houses to find new sources of finance because the commercial banks, which acted as the lender of last resort to the bond houses, were charging a penal interest rate on bond house loans. Non-financial corporations were at the same time looking for interest-earning but flexible assets in which to invest their periodically accumulated liquidity. Demand deposits which paid no interest were no longer attractive, and the tailor-made sales and repurchase agreements which the bond houses offered were very liquid and earned a contractually stated interest rate (*ibid*:167-9). Banks' resources were thus freed up as bond houses were increasingly financed by non-financial corporations, and the banks were then able to finance other activities. In this sense, both developments were equivalent to an increase in bank reserves (*ibid*:170).
- 30 Minsky may just as easily have interpreted the innovations as affecting both money supply and velocity, rather than velocity alone. To argue that "a given volume of reserves now supports more deposits" (1957a:171) and therefore velocity has risen rather than the money supply perhaps implies a failure to break away from the entrenched exogeneity position.
- 31 A full outline of Friedman's monetary theory is beyond the scope of this work, and the preceding paragraph, while simplified, is all that is required here.
- 32 With the exception of Hyman Minsky, as discussed above.
- 33 Kaldor argued that Friedman's own evidence supported the claim that, rather than irresponsibly failing to provide liquidity to the banking system, the Federal Reserve had increased the amount of high-powered money throughout the Depression (1970:13).
- 34 Of course, the stability of velocity as described by Kaldor was of no concern to Friedman. Friedman used permanent rather than actual income; he was able to explain the secular change in velocity; and further, the restatement made money demand or velocity a stable function of a few variables, rather than fixed.
- 35 Wray differentiates these arguments from Kaldor's Keynesian submissions to the *Radcliffe Report*. Kaldor had shifted his position from one of endogenous velocity to endogeneity of the money supply itself (1990:132).
- 36 Cramp (1970) reinforced the arguments of Kaldor and Robinson, noting in particular that some of the evidence of Schwartz and Friedman was taken from the very period (the 1960s) which these theorists admit was the least useful from which to draw conclusions. For over that time, both in the US and the UK, the central bank was concerned to ensure that the "overall demand for funds (=supply of securities) at the rate(s) of interest acceptable to the central bank was met, apart from the sporadic selective control of the quantity of credit flowing through particular channels, such as hire purchase lending" (*ibid*:31).

- 37 Davidson and Weintraub allow for all three cases, that is, productivity may rise, fall or remain constant as output increases. Thus, through the markup over average cost, prices may rise, fall or remain constant following an increase in output (1973:1130).
- 38 This property of money as a store of value only exists because of uncertainty. A decision to hold money as a store of value is simultaneously a decision not to put money into reproducible goods - only when there is no uncertainty can reproducible goods become a store of value.
- 39 That is, the spending power provided by narrowly defined money as well as "near-monies".

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