Pasinetti, Marx and Simple Commodity Production

by

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1. Introduction

Marxian economics has been characterised by a focus on real analytical categories. As pointed out by Hein (2008, p. 16), "money and a monetary rate of interest only enter the stage, when general tendencies have already been derived from 'real analysis'". This approach stems from the predominance of a Walrasian general equilibrium framework in which the role of money is strictly neutral. The analytical foundations to Marxian economics developed by Roemer (1981), for example, are conducted largely in real terms. Furthermore, these foundations fail to take into account the problem of unemployment (see Veneziani 2007, p. 13). For Devine and Dymski (1991, p. 236), the 'restrictive assumptions' associated with Walrasian equilibrium 'rule out phenomena of central interest in Marxian political economy, such as…persistent involuntary unemployment'.

The purpose of this paper is to suggest more general analytical foundations to Marxian economics. At the core of this foundational analysis is the usual consideration of value theory and exploitation, but also captured is the role of unemployment and money. The starting point is Marx's two-stage analysis, as developed in the first volume of *Capital*. The first layer of analysis concerns simple commodity circulation (referred to by Engels as simple commodity production). In the circuit $C - M - C$ commodities are exchanged between producers for the purpose of satisfaction of wants. In the second layer of analysis, Marx turns to the money capital circuit $M - C - M'$ in which exchange value is the main driving force of economic activity. In this layered approach Marx is able to identify the defining features of a capitalist system.

Marx's two-stage approach is modelled here using a framework developed by the great Cambridge system-builder Luigi Pasinetti. In his lecture celebrating 25 years of the *Cambridge Journal of Economics*, Pasinetti (2005) also proposed a two-stage approach to economic analysis; which in addition to its relevance to Keynesian economics can be applied the whole gambit of classical economics, including Marx. The starting point for this two-stage approach is a model of pure production which closely resembles simple commodity production. Production is orientated towards the satisfaction of wants, with no category of profits, and the operation of a pure labour theory of value. This paper will explore how Pasinetti's model can be used to explore the structural differences between simple commodity and capitalist systems.

The first part of the paper will introduce the Pasinetti framework and its results. In the second part, this framework is re-cast as a model of simple commodity production. In the final part, key modifying assumptions are made to introduce a model of capitalist relations of production, followed by a summary and conclusions.

2. The Pasinetti Model of Pure Production

Pasinetti (1981) developed a pure production model for m single-good producing industrial sectors. In this model there is a social division of labour, each individual engaging in production for the purpose of consumption. The model consists of a quantity equation and a price equation, as presented in equations (1) and (2) using the more accessible format developed by Pasinetti (1986).

In each sector the direct and indirect labour required to produce each commodity i is represented by the vertically integrated labour coefficient n_i. Per capita consumption

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coefficients are represented by c_i and final outputs, measured in physical units, by Q_i. The scalar L represents the total stock of labour available in the economy, p_i the money price and w_i the money wage rate

$$
\begin{bmatrix}
1 & 0 & \bullet & \bullet & \bullet & 0 & -c_1 \\
0 & 1 & & & & 0 & -c_2 \\
& & \bullet & & \bullet & \bullet & \bullet \\
& & & \bullet & \bullet & \bullet & \bullet \\
& & & & \bullet & \bullet & \bullet \\
0 & 0 & \bullet & \bullet & \bullet & 1 & -c_m \\
-n_1 & -n_2 & \bullet & \bullet & \bullet & -n_m & 1
\end{bmatrix}
\begin{bmatrix}
Q_1 \\ Q_2 \\ \bullet \\ \bullet \\ \bullet \\ Q_m \\ L
\end{bmatrix}
=
\begin{bmatrix}
0 \\ 0 \\ \bullet \\ \bullet \\ \bullet \\ 0 \\ 0
\end{bmatrix}
\qquad (1)
$$

$$
\begin{bmatrix} p_1 & p_2 & \bullet & \bullet & \bullet & p_m & w \end{bmatrix}
\begin{bmatrix}
1 & 0 & \bullet & \bullet & \bullet & 0 & -c_1 \\
0 & 1 & & & & 0 & -c_2 \\
& & \bullet & & \bullet & \bullet & \bullet \\
& & & \bullet & \bullet & \bullet & \bullet \\
& & & & \bullet & \bullet & \bullet \\
0 & 0 & \bullet & \bullet & \bullet & 1 & -c_m \\
-n_1 & -n_2 & \bullet & \bullet & \bullet & -n_m & 1
\end{bmatrix}
=
\begin{bmatrix} 0 & 0 & \bullet & \bullet & \bullet & 0 \end{bmatrix}
\qquad (2)
$$

Three main results can be established from (1) and (2):

$$Q_i = c_i L, \qquad (3)$$

$$p_i = n_i w \qquad (4)$$

$$\sum_{i=1}^{m} n_i c_i = 1 \qquad (5)$$

For Pasinetti, equation (3) represents a demand-determined theory of production, equation (4) a pure labour theory of value, and equation (5) a macroeconomic

condition for full employment. The latter is a non-trivial determinant solution of the coefficient matrix featured in both (1) and (2). To explain its structure, the binomial term in (5) can be written as:

$$n_i c_i = \frac{N_i}{Q_i} \frac{C_i}{L} \tag{6}$$

where C_i is the total consumption of good i, which is equal to the final quantity of good i produced (Q_i). Since all final outputs produced are also consumed $(Q_i = C_i)$, the binomial term reduces to N_i / L. Therefore, if these binomial terms must add up 1, it follows that the proportions of labour employed in each sector all add to 1:

$$\sum_{i=1}^{m} \frac{N_i}{L} = 1 \tag{7}$$

With the additional assumption that L is set equal to L_f, the total amount of labour available for work, Pasinetti (1981, p. 32) therefore interprets (5) as a condition for full employment. For Pasinetti, Say's Law is satisfied, with supply creating its own demand. Whatever the amount of labour supplied, it is employed to produce goods that are consumed by labour.

Pasinetti shows that full employment is dependent upon there being zero aggregate savings in the pure production model. By manipulation of (6), using (4):

$$n_i c_i = \frac{C_i p_i}{wL} \tag{8}$$

The proportion of national income wL that is spent as $C_i p_i$ in sector i is represented in each binomial term. Under the full employment condition these binomials must add up 1; full employment requires full expenditure of national income. This is interpreted by Pasinetti as the 'Keynesian effective demand condition for full employment' in which there are zero aggregate savings (Pasinetti, 1986, p. 422). It should be noted that in this model Pasinetti (1981, p. 35) allows for individuals to save, 'but there must be other individuals who dissave by the same amount, so that savings and dissavings, in the aggregate, cancel each other out.' Pasinetti emphasises the macroeconomic structure of his full employment condition, based on zero aggregate savings.

3. A Model of Simple Commodity Production

The term 'simple commodity production' has provoked considerable controversy in Marxian economics. This stems from a supplement which Engels included in the first publication of *Capital*, volume 3 (see Marx 1981, p. 1027-47). Marx's critics at the time argued that since prices diverge from values, as revealed in volume 3, this undermines the relevance of labour quantities in explaining prices. In reply, Engels introduced a pre-capitalist stage of history (simple commodity production) in which prices are proportional to values, before capitalist relations are introduced. Values are given a solid foundation, rooted in historical circumstances, in the determination of prices. On this basis, the consideration of simple commodity circulation in the first part of *Capital*, volume 1, has been interpreted as a model of pre-capitalist simple commodity production.

This historical interpretation has easily been demolished by scholars of Marx. Identifying actual pre-capitalist societies in which values and prices are proportional has proven extremely difficult, and required concepts such as abstract labour are so tied up with the workings of a capitalist system, they cannot easily commute to pre-capitalist modes of production (Diquattro 2007). It has proven more viable to interpret simple commodity production as a logical first layer in the analysis of capitalist relations of production. Morishima and Catephores (1975, p. 324) provide an extensive critique of Engels, interpreting simple commodity production as an 'hypothetical abstract model': one that abstracts from some of the detail of capitalist production in order to capture its key characteristics. A two-stage logical sequence starts with simple commodity production as a basis for unravelling the structure of the second of the two capitalist layers. Capitalist relations modelled in the first stage are built upon in the second layer of analysis, which looks at a full blown capitalist circuit of exchange value.

The starting point for capitalist wealth is the circulation of commodities, as outlined in the first three chapters of *Capital*, volume 1. Simple commodity circulation, which we will speak of interchangeably as simple commodity production, involves the exchange of use-values between independent producers. These producers trade their own produce for use values produced by other producers. Hence: 'The simple circulation of commodities – selling in order to buy – is a means to a final goal which lies outside circulation, namely the appropriation of use-values, the satisfaction of needs' (Marx, 1976, p. 253).

The exchange of use values between producers requires specialisation as part of a social division of labour. Without any great analytical leap, this specialisation can be represented by the Pasinetti pure production model. In the quantity equation (1), single commodity producers can be assumed to operate in industrial sectors. Output of the single commodity produced by each sector i is thus produced by a group of independent producers. And since the only outlet for final goods in the Pasinetti framework is to individual consumption, this system can also model the satisfaction of wants as the sole purpose of production.

Turning to the Pasinetti price equation (2), the uniform wage rate (w) models the role of labour mobility under simple commodity production. Independent producers in this hypothetical system are not constrained by any feudal ties. Free movement of labour between sectors ensures that a uniform wage rate is paid for each unit of labour. Morishima and Catephores (1975, p. 313) argue that this assumption is required to underpin the capitalist nature of simple commodity production. In contrast, the Indian caste system, which restricts the movement of labour, would be characterised as a pre-capitalist mode of production.

Similarly, for uniform wages to be attributed to each of unit labour an abstraction is required from the concrete individual labour associated with individual producers. Joan Robinson associated concrete labour with a pre-capitalist setting: 'In an artisan economy, each producer has his own skill and his own stock of tools: the 'labour commonly employed in acquiring or producing any commodity' has its own special character; it cannot be reduced to a simple quantity expressed as a number of hours of work' (Robinson 1975, p. 144). In the first layer of capitalist relations, however, as

represented by simple commodity production, abstract labour is required so that common units of labour can be compared across sectors.

With the introduction of prices, a pure labour theory of value is established. In the Pasinetti system prices are proportional to values, as we saw in equation (4). This proportionality suggests that there is a just price, with prices reflecting the contribution of labour to the production process. With one additional assumption, an egalitarian solution can be established - a defining feature of classless simple commodity production. All that is required is for each unit of labour to consume the same subsistence vector $\mathbf{c}$. Each unit of labour requires c_i of this subsistence bundle to be spent on commodity i. This contrasts with Pasinetti's model, in which consumption is not necessarily at subsistence level, and can vary between agents.

This modified Pasinetti model represents a simple commodity production economy in which there is no extraction of surplus value. The binomial term in (6) can be interpreted to represent the labour embodied in per capita consumption of good i. Each unit of labour consumes an amount of good i according to the proportion C_i / L, with N_i / Q_i representing the (vertically integrated) amount of labour required for its production. The summation term $\sum_{i=1}^{m} n_i c_i$ therefore represents the amount of labour embodied in the consumption requirements of a unit of labour (the value of labour power). Under condition (5), where the value of labour power is set equal to 1, it follows that each unit of labour, consuming the same subsistence bundle, produces zero surplus value. Our model of simple commodity production produces an egalitarian solution in which there are no social classes.

The identical subsistence assumption also has consequences for how money is defined in the simple commodity system. With each unit of labour paid a subsistence level, there is no room for either borrowing or savings – in contrast to the Pasinetti system. Money can have only a limited role in facilitating exchange of use-values between commodity producers. For Marx, money has two key functions in simple commodity exchange. The first function of money is as a measure of value, to 'convert the value of all the manifold commodities into prices, into imaginary quantities of gold' (Marx 1976, p. 192). For simplicity, gold is assumed to be the money commodity, providing a homogeneous vehicle for representing abstract labour. With values measured in units of gold, the exchange of commodities can be governed by money prices.

The second function of money is as a medium of circulation. As emphasised by De Brunhoff (1973, p. 30), this follows from the definition of money as a measure of value. By providing the basis for the standard of price, the measure of value allows exchange to take place; it allows money to circulate in the exchange of commodities. In addition, the circulation of money reinforces the legitimacy of prices, making the exchange of commodities operational

Simple commodity exchange has the structure $C - M - C$, where commodities are exchanged for commodities (C), with money as the circulating medium (M). In the first part of the commodity circuit the producer sells his commodity for money $(C - M)$, so long as the fruit of his labour is useful to the purchaser. In the second part, the purchaser buys the commodity from the seller $(M - C)$. 'As a means of circulation, money circulates commodities, which in and for themselves lack the

power of movement, and transfers them from hands in which they are non-use-values into hands in which they are use-values…' (Marx 1976, p. 211). Under the social division of labour a rich network of social connections between sellers and purchasers of use-values is made possible by the circuit of money.

Marx's first two functions of money can be nested in our Pasinetti model of simple commodity production. First, the existence of prices, as represented by equation (4) is consistent with money as a measure of value. If w is a money wage rate, then by definition we have money prices. Second, money as a medium of circulation is consistent with Pasinetti's system of multi-commodity circulation, and the operation of Say's Law. As defined by Baumol (1977), Say's Law

'asserts that people offer things for sale only because they want other goods and services in exchange. If they accept money for the goods they sell, they do not do so because they want the money for its own sake but because they desire to take the money *at once* and buy other goods with it.'

We saw earlier that equation (5) has been interpreted as a condition for full employment: Pasinetti's demonstration that Say's Law operates in the pure production model. Following our interpretation of the Pasinetti model, this can also be interpreted as a formalisation of Say's Law under simple commodity production. Under a pure labour theory of value, with no social classes and zero surplus value, production directed towards the satisfaction of wants, and a strictly neutral role for money, full employment is guaranteed under condition (5).

4. A Model of Capitalist Monetary Production

To transform our Pasinetti-inspired model of simple commodity production into a model of capitalist monetary production, two further analytical steps are required. First, the Pasinetti quantity equation, as represented by (1), can be re-cast in block matrix form:

$$\begin{bmatrix} \mathbf{I} & -\mathbf{c} \\ -\mathbf{n} & 1 \end{bmatrix} \begin{bmatrix} \mathbf{Q} \\ L \end{bmatrix} = \begin{bmatrix} \mathbf{O} \\ 0 \end{bmatrix} \qquad (9)$$

where $\mathbf{I}$ is an $m \times m$ identity matrix, $\mathbf{c}$ is an $m \times 1$ vector of consumption coefficients, $\mathbf{Q}$ is an $m \times 1$ vector of final outputs, $\mathbf{O}$ is an $m \times 1$ vector of zeros, $\mathbf{n}$ is a $1 \times m$ vector of vertically integrated labour coefficients, and L is the scalar representing the amount of labour available for work. In the pure production model developed by Pasinetti (1981), vertically integrated labour coefficients have an input-output structure:

$$\mathbf{n} = \mathbf{l}(\mathbf{I} - \mathbf{A})^{-1} \qquad (10)$$

where $\mathbf{A}$ is an $m \times m$ matrix of interindustry technical coefficients and $\mathbf{l}$ is an $1 \times m$ vector of direct labour coefficients, each element l_i representing the direct labour required to produce each unit of gross output in sector i. By defining $\mathbf{X}$ as the $m \times 1$ vector of gross outputs, the vector of final outputs is

$$\mathbf{Q} = (\mathbf{I} - \mathbf{A})\mathbf{X} \qquad (11)$$

The more familiar closed input-output model can be shown by combining (9), (10) and (11):

$$\begin{bmatrix} (\mathbf{I}-\mathbf{A}) & -\mathbf{c} \\ -\mathbf{l} & 1 \end{bmatrix} \begin{bmatrix} \mathbf{X} \\ L \end{bmatrix} = \begin{bmatrix} \mathbf{O} \\ 0 \end{bmatrix} \qquad (12)$$

The second key analytical step, to introduce capitalist production relations, is to open up the system to exogeneous activity. Let $\mathbf{f}$ be an $m \times 1$ vector of final demand, each element f_i representing the production of final goods by sector i. Final goods consist of capitalists' consumption goods and investment goods. By introducing this new vector to (12):

$$\begin{bmatrix} (\mathbf{I}-\mathbf{A}) & -\mathbf{c} \\ -\mathbf{l} & 1 \end{bmatrix} \begin{bmatrix} \mathbf{X} \\ L \end{bmatrix} = \begin{bmatrix} \mathbf{f} \\ 0 \end{bmatrix} \qquad (13)$$

A category of profit income is now required, out of which investment and capitalist consumption can be spent. Hence, a modified Pasinetti price equation takes the form

$$\begin{bmatrix} \mathbf{p} & w \end{bmatrix} \begin{bmatrix} (\mathbf{I}(\dfrac{1}{1+r})-\mathbf{A}) & -\mathbf{c} \\ -\mathbf{l} & 1 \end{bmatrix} = \begin{bmatrix} \mathbf{0} & 0 \end{bmatrix} \qquad (14)$$

where $\mathbf{p}$ is an $m \times 1$ row vector of money prices and r is a scalar mark up of profits on capital inputs. With this new profit element, the usual capitalist price equation

$$\mathbf{p} = (1+r)(\mathbf{p}\mathbf{A} + w\mathbf{l}) \qquad (15)$$

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can be identified in (14).

The two equations of the new quantity system now have the structure:

$$\mathbf{X} = \mathbf{AX} + \mathbf{c}L + \mathbf{f} \qquad (16)$$

$$\mathbf{L} = \mathbf{lX} \qquad (17)$$

Following the approach developed in Trigg and Lee (2005: 35-36), a scalar multiplier can be derived from this type of input-output model. By substituting (17) into (16):

$$\mathbf{X} = \mathbf{AX} + \mathbf{clX} + \mathbf{f} \qquad (18)$$

From (11), we know that $\mathbf{X} = (\mathbf{I} - \mathbf{A})^{-1}\mathbf{Q}$. Hence, from (10) it follows by vertical integration that

$$\mathbf{lX} = \mathbf{l}(\mathbf{I} - \mathbf{A})^{-1}\mathbf{Q} = \mathbf{nQ} \qquad (19)$$

Equation (18) can therefore be re-expressed as

$$\mathbf{Q} = \mathbf{cnQ} + \mathbf{f} \qquad (20)$$

By multiplying throughout by $\mathbf{n}$ such that

$$\mathbf{nQ} = \mathbf{ncnQ} + \mathbf{nf} \qquad (21)$$

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the Keynesian multiplier equation

$$nQ = \frac{1}{1 - nc} nf \qquad (22)$$

can be derived. The term $1/1 - nc$ is a scalar multiplier with an interesting denominator (see Trigg 2006). The scalar nc captures the value of labour power, that is the labour embodied (n) in the amount consumed (c) per unit of labour power. Hence the denominator of the multiplier $(1 - nc)$ represents the share of surplus value - the amount of surplus value extracted per unit of labour power. An economically viable solution to (22), with a positive scalar multiplier, requires the production of positive surplus value $(nc < 1)$.

This aggregate model of capitalist production can be sharply contrasted with our macroeconomic model of simple commodity production. Since there is zero final demand under the Pasinetti model $(nf = 0)$, it can be summarized by modifying (22) such that

$$(1 - nc)nQ = 0 \qquad (23)$$

For (25) to hold a non-trivial solution requires that nQ is positive and hence $nc = 1$: the zero surplus value condition. To summarise:

Under simple commodity production $\qquad nc = 1 \qquad (24)$

Under capitalist production $$\mathbf{nc} < 1 \qquad (25)$$

Hence, on this interpretation, a key characteristic of simple commodity production, that must be relaxed under capitalist conditions of production, is the assumption of zero surplus value. Furthermore, the capitalist system no longer automatically satisfies the condition for full employment, which is also represented by (25). Capitalist relations of production simultaneously introduce exploitation and break the condition for full employment. Since final demand is exogenous to the multiplier equation (22), given the size of the multiplier there is only one specific quantity of final demand that will deliver full employment. In contrast to simple commodity production, the capitalist system does not automatically deliver a full employment outcome. Say's Law no longer holds, with supply not automatically generating its own demand.

This analysis reveals the remarkable synthetic power of Pasinetti's two-stage approach. By comparing simple commodity production with capitalist production, it links the analytical foundations of unemployment directly to the labour theory of value and exploitation. Marxian analysis of Say's Law, and its failure to hold under capitalist production relations, tends to be conducted independently of value theoretic considerations (see, for example, Roemer 1981, p. 177) However, at the high level of abstraction offered by Pasinetti's approach, our contribution is to give both approaches the same foundational starting point.

Moreover, this synthetic starting point allows a consideration of coercion as a basis for exploitation. Our approach contrasts, for example, with Roemer's 'force-free definition of exploitation' (Schwartz 1995, p. 279), in which 'unemployment (one

aspect of forced labour) is a peripheral concern' (Dymski and Elliot 1989, p. 344).

Under unemployment, as a central tenet of capitalism, an exploited workforce is

compelled to sell its labour power.

This point of synthesis can also be extended to include a Marxian analysis of money.

We first introduce an additional function of money: money as a hoard. As defined by

Arnon (1984, p. 564), 'a hoard is the creation of more use values than are consumed.'

The existence of a hoard has its roots in the separation of purchase from sale that

comes about because of the circulation of money. Under capitalist production, without

the immediate requirement of spending exchange value on necessities, as in simple

commodity production, money can be held for purposes of pure avarice, as surplus

value. Money here is more than just the 'piling up' of money when there is a break in

circulation, and has more than just a technical function as way of facilitating

continuous circulation (*ibid*, p. 565). For the capitalist 'the precondition for his hoard

formation is thus his successive production of surplus product – the repository of his

surplus-value that is to be realized' (Marx 1978, p.569).

A corollary to the formation of money hoards is that money has a velocity of

circulation. When money is taken out of circulation as a hoard, the remaining amount

of money in circulation has to facilitate the circulation of commodities. As explained

by Aoki (2001, p. 942), 'the length of time withheld until re-injection back into

commodity circulation via use in purchase implies variable *velocity*.' Money must

turnover at a required speed or velocity of circulation. 'Given the total number of

times all the circulating coins of one denomination turn over, we can arrive at the

average number of times a single coin turns over, or, in other words, the average velocity of circulation of money' (Marx 1976, p. 216).

The role of money as a hoard, and its velocity of circulation, can be modelled by adopting Marx's simplifying assumption, in the first two volumes of *Capital*, that prices are equivalent to values $(\mathbf{p} = \mathbf{n})$.[1] Hence, let $\mathbf{nf} = \mathbf{pf} = f$ be the scalar volume of money final demand, and $\mathbf{nQ} = \mathbf{pQ} = y$ be total money net income. It follows that

$$y = \frac{1}{1 - \mathbf{nc}} f \qquad\qquad (27)$$

The aggregate multiplier captures the relationship between the money cast into circulation and the money received as income. The money cast into circulation as final demand is represented by f , and the velocity of circulation is captured by the multiplier $1/1 - \mathbf{nc}$. If, for example, the capitalists cast £1,000 into circulation as final demand, with a velocity of 4 the total net income (y) will be £4,000. The initial injection has a fourfold multiplier effect impact on total income. In equilibrium this is the same as the average velocity with which the money injection circulates around the economy.[2]

It follows that condition (25) is required for the definition of a positive velocity of circulation. In other words, capitalist production requires a positive velocity of circulation. It also requires that there is positive savings (hoarding) out of aggregate net income.[3] Savings out of current income, after accounting for consumption outlays, are directed to new investment. In sharp contrast, condition (24), capturing simple

commodity production, requires zero total savings and by implication an infinite velocity of circulation – since the denominator of the multiplier is zero. This is consistent with our earlier discussion of how under simple commodity circulation money cannot linger in the hands of traders, since all outputs all goods supplied are instantly exchanged for goods demanded.

To summarise, money hoards and the velocity of circulation underpin the multiplier relationship at this abstract level of analysis. To undermine the condition for full employment, the multiplier relationship requires the availability of money as a hoard. The Pasinetti framework allows a stepwise building up of the functions of money from its limited role as a medium of circulation and measure of value, under simple commodity production, to its role as a hoard under capitalist circulation.

5. Conclusions

Using Pasinetti's pure production model to model simple commodity production, a two-stage Marxian approach is suggested. In simple commodity production, full employment of labour is guaranteed under Say's Law and money is strictly neutral. Pasinetti's system allows these two conditions to be formalised for a multisectoral economy. By contrast, under capitalist monetary production, with exogenous final demand and the introduction of social classes, these two conditions are relaxed. Full employment is no longer established, dependent on the scale of exogenous final demand and the size of the multiplier, which in turn is dependent on the volume of surplus value extracted from the workforce. In this model, money also takes on an additional hoarding function with a velocity of circulation. In contrast to the Walrasian approach, which has been dominant in Marxian economics, under an

alternative multiplier framework, unemployment and the non-neutrality of money take centre stage.

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Footnotes

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[1] More specifically, the assumption of proportionality between prices and values will hold under equal organic compositions of capital.

[2] See Trigg (2006), Chapter 4, for a detailed explanation of how this aggregate model relates to the circuit of money between departments of production.

[3] We saw earlier, in equation (8), that the full employment condition requires zero aggregate savings out of national income.