

Macroeconomics Without the LM Curve: An Alternative View

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### **Abstract**

This paper develops a “fully articulated” Post Keynesian alternative to the “New Consensus” macroeconomic model, based on explicitly Post Keynesian hypotheses about the inflation process, the income-generating process and the appropriate conduct of monetary policy. The paper demonstrates how the equilibrium configuration of this model can be manipulated by non-monetary policy interventions, including fiscal policy and incomes policy. One (perhaps surprising) result that emerges from the analysis is that in the context of the proper policy environment, inflation targeting can have a positive impact on real economic performance.

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## 1. Introduction

It has become commonplace to refer to a “New Consensus” (NC) in macroeconomics, based on a policy-oriented macroeconomic model comprising three key components: a description of the income-generating process (an IS curve); a description of the inflation process (a Phillips curve incorporating the accelerationist hypothesis); and a description of how monetary policy is conducted (a Taylor rule).<sup>1</sup> Apart from monetary policy, no other policy interventions are usually entertained in this model, giving rise to what Rochon and Setterfield (2007) term “monetary policy dominance”. Moreover, the ultimate objective of monetary policy in the NC is to establish the equilibrium rate of inflation. The equilibrium values of real variables are exogenously given by their unique, supply-determined “natural” rates.

It is already well known that by only modestly amending this NC model, it is possible to arrive at a macroeconomic policy model that is closer in spirit to the Post Keynesian (PK) vision of how the economy operates and is affected by policy interventions (Lavoie, 2004, 2006; Setterfield, 2004). The aim of what follows is to go beyond this approach of modestly amending the NC framework, by developing a more “fully articulated” PK alternative to the NC.<sup>2</sup> The purpose of this venture is twofold: first, to provide explicitly PK descriptions of the income-generating and inflation processes; and second, to furnish a PK account of the proper conduct of macroeconomic policy. It

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<sup>1</sup> See, *inter alia*, Clarida et al (1999), Meyer (2001), McCallum (2001) and Woodford (2003) for more detailed discussion of the architecture of this model, and Allsopp and Vines (2000) and Taylor (2000) for description of the model as a consensus amongst central bankers and mainstream macroeconomists.

<sup>2</sup> It is important at this juncture to acknowledge Palley (1996, chpt. 11) as a precursor to this exercise. The discussion that follows can be thought of as building on Palley’s work, by more explicitly modelling the income-generating process, and by expanding on Palley’s discussion of both the range of policy interventions and the appropriate conduct of monetary policy.

will be shown that the resulting, policy-oriented macroeconomic model is faithful to basic PK preconceptions regarding the innate workings of the economy, and produces important (and sometimes surprising) policy results.

Before proceeding, a brief note on methodology is in order. The model developed in this paper – like the NC model – is an explicitly short run construction. Mainstream macroeconomics treats the short run as a temporary departure from long run steady state conditions that can be identified *a priori*. In PK macroeconomics, however, the short run constitutes the long run, which is ultimately understood as a path-dependent product of a sequence of short run events. In what follows, no pretence is made at identifying these path-dependent long run outcomes. The analysis abstracts from longer-term dynamics, such as arbitrage responses to differences between the (risk adjusted) rates of return on real and financial capital, adjustments to discrepancies between actual and normal rates of capacity utilization and actual and target rates of profit,<sup>3</sup> and changes in the state of long run expectations. These longer-term dynamics are “locked up without being ignored” (Kregel, 1976), by virtue of our assuming that the short run is at all times characterized by a “long run equilibrium of action” (Chick, 2002). This involves the equalization of expected (rather than actual) long run rates of return, coupled with a constant state of long run expectations – so that decision makers will change neither their forecasts of long run outcomes, nor the confidence they invest in long run expectations and normal values of variables, in response to short-run outcomes. Hence no changes in behaviour will be observed as a result of discrepancies between, for example,

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<sup>3</sup> In PK macroeconomics, normal rates of capacity utilization and target rates of profit are treated as conventions. Discrepancies between these conventions and actual outcomes are understood to give rise to changes in the conventions themselves. For example, differences between the actual and normal rates of capacity utilization will eventually result in changes to the latter rather than the former (see, for example, Lavoie, 1996; Casetti, 2006).

the actual and normal rates of capacity utilization or the (risk adjusted) rates of return to real and financial capital that are associated with positions of short-run equilibrium. Of course, there is no necessary implication that successive short run outcomes will corroborate long run expectations and/or justify continuance of the current state of confidence. A long run equilibrium of action may eventually be disturbed, then, triggering longer run dynamics (arbitrage activity, revisions to the normal rate of capacity utilization, and so forth) that will disturb current short run equilibrium conditions and provoke the sort of path-dependent changes that are characteristic of the PK long run. But the investigation of these developments is deemed beyond the scope of this paper.

The remainder of the paper is organized as follows. Section 2 describes the precise structure of the fully articulated PK model alluded to above, detailing each of the three main components of the model (the inflation process, the income-generating process and the conduct of monetary policy) in a manner that parallels the structure of the NC model. Section 3 discusses the general equilibrium solution of this structural model. It also explores the consequences of non-monetary policy interventions in the economy (including fiscal policy and incomes policy) and draws attention to the main policy conclusions associated with the model. Finally, section 4 offers some conclusions.

## **2. Macroeconomics Without the LM Curve: A Basic Structural Model**

The canonical NC model is, by now, well known and is not repeated here. Instead, the focus in this section is on developing a “fully articulated” PK alternative to the New Consensus. As intimated in the introduction, this involves providing PK accounts of each of three key components of the economy: the conduct of monetary policy, the inflation process and the income-generating process. In this section, then, our purpose is chiefly descriptive. Apart from some brief remarks

about the objectives of monetary policy, discussion of policy implications is deferred until section 3.

*i) The conduct of monetary policy*

In the NC model, monetary policy is described in terms of a Taylor rule. This is usually justified on the basis that it provides a good description of how central banks actually conduct monetary policy (see, for example, Taylor, 1993, 1999). Since monetary policy is ultimately discretionary, however, the focus here is not on how central banks *do* conduct monetary policy, but on how (from a PK perspective) they *ought to* conduct policy. In other words, we focus on specifying a monetary policy rule that is consistent with both the structure of a PK economy and the policy ambitions of PK macroeconomics.

An enduring theme in PK monetary economics is that the quantity of money in circulation is endogenously generated by the process of credit creation within the private sector. The central bank is understood to vary the size of the monetary base in response to the liquidity requirements of commercial banks – but at a price of its own making. The short-term nominal interest rate is thus the key instrument of monetary policy.

Within this broad framework, different concrete recommendations for the conduct of monetary policy can be identified (Rochon and Setterfield, 2007). These recommendations share two common features. First, they do not focus on inflation targeting. Second, they interpret monetary policy as a complement to (rather than substitute for) other macroeconomic policy instruments. In what follows, we focus on one particular PK monetary policy rule – the Pasinetti (1981) “fair” interest rate rule – which has distributional outcomes as its explicit objective. Emphasis is placed

on the Pasinetti rule because its focus on distributional outcomes complements the importance of income distribution elsewhere in our model. It is also in keeping with the general sense in PK economics that income distribution matters, and is (or ought to be) an important concern for macroeconomic policy makers (see, for example, Galbraith, 2001).<sup>4</sup>

The essential purpose of the Pasinetti rule is to set the interest rate so as to keep constant the quantity of labour time that creditors can purchase in an economy characterized by constant wage and profit shares. Specifically, the Pasinetti rule sets the interest rate so that, *ceteris paribus*, the value of any initially outstanding stock of debt measured in wage units will remain constant over time. One way of thinking about the purported fairness of this rule is as follows. Suppose that a subset of wealth owners initially choose to act as rentiers, lending their wealth rather than directly engaging in productive activities. The Pasinetti rule ensures that if, at any point in time, these rentiers “turn capitalist” and directly employ labour in order to produce goods, they will find themselves neither more or less advantaged in this pursuit by the earnings they have previously amassed as rentiers.

The value of the interest rate under the Pasinetti rule can be derived by first considering the following expression:

$$\frac{D_t}{W} = c \quad [1]$$

where  $D_t = D_0 e^{it}$  is the current value of an arbitrarily chosen initial stock of debt ( $D_0$ ) that has been

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<sup>4</sup> See Pasinetti (1981), Lavoie and Seccareccia (1999) and Rochon and Setterfield (2007) for previous discussions of the Pasinetti rule.

allowed to accrue compound interest (with  $i$  denoting the nominal interest rate).  $W$  is the nominal wage and  $c$  denotes a constant. It follows from [1] that:

$$\hat{D}_t = w$$

where  $w$  is the rate of growth of the nominal wage, or, given the value of  $D_t$  as described above:

$$i = w \quad [2]$$

Now consider the wage share of income:

$$\omega = \frac{WN}{PQ}$$

where  $\omega$  denotes the wage share,  $P$  is the general price level and  $N/Q$  denotes the reciprocal of the level of labour productivity. With  $\omega = \bar{\omega}$ , it follows that:

$$w = p + q$$

where  $p$  is the rate of inflation and  $q$  is the rate of growth of labour productivity. Substituting this expression into [2] yields:

$$i = p + q \quad [3]$$

In other words, when the nominal interest rate is set equal to the rate of inflation plus the rate of productivity growth, the value (in wage units) of any initial stock of debt will remain constant, given  $\omega = \bar{\omega}$ .<sup>5</sup> Equation [3] thus establishes the value of Pasinetti's fair rate of interest.

Given that we are constructing a short run model, we assume that there is no technical

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<sup>5</sup> Alternatively, equation [3] implies that the real interest rate must be set equal to the rate of productivity growth in order to achieve the same distributional objective.

progress and that this, in turn, renders fixed the labour-output ratio on the supply side of the economy.<sup>6</sup> Based on these assumptions,  $q = 0$  and equation [3] reduces to:

$$i = p \quad [4]$$

The version of Pasinetti's fair interest rate rule in equation [4] constitutes the interest rate operating procedure (IROP) used by the central bank in our "fully articulated" PK model. Note that this IROP is essentially a simplified description of a money supply process, in which the central bank sets the price of credit and then accommodates variations in the total demand for credit (and hence the total demand for money) via the commercial banking system. In other words – and consistent with the principles of PK monetary theory outlined earlier – the quantity of money supplied is endogenously determined, and we find ourselves doing "macroeconomics without the LM curve".<sup>7</sup> This is also a feature of NC macroeconomics, of course. But notice that the IROP in [4], based on Pasinetti's fair rate of interest, is very different from the Taylor rule favoured by the NC. Hence whilst the purpose of the latter is macroeconomic stabilization, the objective of the former is connected with the functional distribution of income. In fact, in our "fully articulated" PK alternative to the NC, the central bank not only explicitly recognizes that it plays a role in determining the distribution of income (a point that has been made repeatedly by PK authors – see, for example, Smithin 2004), but acts in a manner that is both wholly concerned and fully consistent with this role.

Finally, note that it follows from the IROP in [4] that:

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<sup>6</sup> Note that throughout this paper, production is implicitly modelled in terms of a fixed coefficient (Leontieff) production function.

<sup>7</sup> In fact, the money supply process described above is consistent with pure accommodationism or "horizontalism," in which commercial banks keep interest rates constant even as the demand for credit fluctuates, and the interest rate is thus exogenous in the sense that it is determined only by the decisions of the central bank (see Wray, 2006).

$$i^* = p^* \quad [4a]$$

where an asterisk denotes the equilibrium value of a variable.

*ii) The inflation process*

In the NC model, inflation is exclusively caused by excess aggregate demand (over and above the level of demand consistent with a unique and stable supply-determined equilibrium level of output/rate of unemployment). According to PK economics, however, whilst there can be “demand-pull” inflations, there are also processes on the supply side of the economy that can give rise to the steady growth of prices. In particular, PK economics admits the possibility that inflation is rooted in conflict over the distribution of income. It is this conflicting claims inflation process that is central to the model of inflation described below, and which forms a part of our “fully articulated” PK model.<sup>8</sup>

We begin with the wage determination process, which we describe as:

$$w^T = \alpha(\omega_w - \omega) + q + p^e$$

$$w = \mu w^T, \quad 0 < \mu < 1$$

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<sup>8</sup> See Lavoie (1992, chpt.7) and Burdekin and Burkett (1996) for surveys of the conflicting claims theory of inflation. The specific model outlined above can be found in Setterfield (2007a).

Note that conflicting-claims inflation can be characterized as involving “excess aggregate demand” – specifically, an excess aggregate demand from wage and profit earners for real income. However, in NC theory, “excess aggregate demand” is a product market phenomenon defined strictly in relation to potential output (with the latter determined strictly on the supply-side of the economy), whereas in conflicting-claims theory, the “excess aggregate demand” identified above arises from irreconcilable distributional claims that can materialize at *any* level of output. I am grateful to Gilberto Tadeu Lima of the University of São Paulo, Brazil, for drawing this to my attention.

which, upon substitution (and assuming  $\alpha = 1$  for simplicity), yields:

$$w = \mu[(\omega_w - \omega) + q + p^e] \quad [5]$$

where  $w^T$  and  $\omega_w$  are workers' target rate of growth of nominal wages and target wage share of income, respectively,  $\omega$  is the actual wage share, and  $p^e$  denotes the expected rate of inflation. In this formulation, workers aspire to achieve and maintain a specific share of total income. They therefore calculate a target rate of growth of nominal wages ( $w^T$ ) based on the rates of productivity growth and expected inflation, and the difference between their target wage share and the actual wage share.<sup>9</sup> Productivity and inflation are included in the calculation of target nominal wage growth because, *ceteris paribus*, variation in either will affect the wage share unless the nominal wage is adjusted in compensating fashion.<sup>10</sup> The degree to which workers' nominal wage growth target is then incorporated into the *actual* growth of nominal wages depends on the parameter  $\mu$ , which represents the relative power of workers *vis a vis* firms in the wage bargain. We hypothesize that:

$$\mu = \mu_u u + \mu_Z Z \quad [6]$$

In other words,  $\mu$  varies directly with the rate of capacity utilization,  $u$ ,<sup>11</sup> and institutional features

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<sup>9</sup> Note that we can set  $p^e = p_{-1}$  in equation [5] if workers bargain for nominal wage increases on the basis of past inflation rather than expected future inflation. This would have no effect on the steady state rate of inflation derived below.

<sup>10</sup> This is evident from the definition of the wage share stated earlier, in which either a rise in  $P$  or a fall in  $N/Q$  (the reciprocal of the level of labour productivity) will cause  $\omega$  to fall, unless these changes are offset by a rise in  $W$ .

<sup>11</sup> This is equivalent to claiming that  $\mu$  varies inversely with the rate of unemployment,  $U$ , given that:

of the labour market ( $Z$ ) – including labour law, trade union representation, the structure of the employment relation and so forth – that affect the ability and willingness of workers to seek nominal wage increases.

The price setting behaviour of firms is modelled as:

$$p = \varphi(\omega - \omega_F) + w - q \quad , \quad 0 < \varphi < 1 \quad [7]$$

where  $\omega_F$  is the target wage share of firms, and  $\omega_w > \omega_F$  by assumption. According to equation [7], inflation depends upon the rate of growth of unit labour costs ( $w - q$ ) and the difference between the actual wage share and firms' target wage share. The parameter  $\varphi$  is determined by the state of competition in product markets and the corresponding ability of firms to mark up prices in excess of the average costs of production. In this way,  $\varphi$  is analogous to Kalecki's (1971) degree of monopoly, and will therefore be influenced by factors such as the concentration of domestic markets, the price elasticity of demand for final output and the amount of international competition faced by firms. In fact, equation [7] is essentially a dynamic version of a standard mark-up pricing equation in which the mark up (and hence  $\omega_F$ ) is determined by a target rate of return on firms' assets.<sup>12</sup> Specifically, it follows from the definition of the rate of profit that:

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$$U = 1 - \frac{ulK}{vL}$$

where the labour-output ratio,  $l$ , and the capital-output ratio,  $v$ , are fixed coefficients derived from the Leontieff production technology on the supply side of the economy, and both the labour force ( $L$ ) and the capital stock ( $K$ ) are assumed given in the short run.

<sup>12</sup> See Lee (1998, p.206) for discussion of the prevalence of target rate of return pricing amongst business enterprises.

$$\omega_F = 1 - \frac{r^T v}{u_n}$$

where  $r^T$  denotes firms' target rate of return and  $u_n$  is the normal rate of capacity utilization at which the target rate of return is calculated. Note that some of the same factors that influence  $\varphi$  may also influence the target rate of return on firms assets and hence the value of  $\omega_F$ . The significance of this observation will become clear in the policy discussion in section 3.

The model of inflation outlined above exhibits several important PK features. First, wage bargaining is conducted in nominal terms (equation [5]). This, in turn, highlights a second PK feature of the inflation model above: the real wage is ultimately determined in the goods market by the pricing decisions of firms.<sup>13</sup> Finally, there is an absence of full indexation in both wage and price setting behaviour ( $0 < \mu, \varphi < 1$ ). In other words, neither workers nor firms are assumed to have the market power necessary to fully incorporate wage share aspirations (and, in the case of workers, productivity growth and inflation expectations) into final wages and prices.

Recalling that  $q = 0$ , equations [5] and [7] can be re-written as:

$$w = \mu[(\omega_W - \omega) + p^e] \quad [5a]$$

and:

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<sup>13</sup> To see this, note that by re-arranging [7] we get:

$$w - p = q - \varphi(\omega - \omega_F)$$

– i.e., the rate of growth of the real wage is independent of the relative power of workers in the wage bargain ( $\mu$ ) and workers target wage share ( $\omega_W$ ).

$$p = \varphi(\omega - \omega_F) + w \quad [7a]$$

Steady state equilibrium requires that  $p^e = p$  and  $\omega = \bar{\omega}$  which, from the definition of the wage share, implies  $p = w$  (given that  $q = 0$ ). Imposing the second of these equilibrium conditions on [7a] we arrive at the result:

$$\omega^* = \omega_F \quad [8]$$

whilst imposing both equilibrium conditions on [5a] yields:

$$p^* = \frac{\mu}{1 - \mu} (\omega_W - \omega^*) \quad [9]$$

where an asterisk denotes the equilibrium value of a variable. Combining equations [8] and [9] then provides the following expression for the equilibrium rate of inflation:

$$p^* = \frac{\mu}{1 - \mu} (\omega_W - \omega_F) \quad [10]$$

Finally, substituting [6] into [10], we arrive at:

$$p^* = \frac{\mu_u u^* + \mu_Z Z}{1 - (\mu_u u^* + \mu_Z Z)} (\omega_W - \omega_F) \quad [11]$$

where the value of  $Z$  is taken as given.

*iii) The income-generating process*

The canonical NC model relates the real to the monetary sector by means of a static IS curve, in which the level of output is a function of the interest rate.<sup>14</sup> In the fully articulated PK model developed here, a *dynamic* IS relationship is derived from a neo-Kaleckian growth model, in which the growth of output is related to the interest rate. As befits the short run structure of the model under construction, however, we will ultimately focus attention on the relationship between the rate of capacity utilization and the rate of interest that results from this model .

We begin, following Hein (2006), by distinguishing between gross profits ( $\Pi$ ) and enterprise profits ( $\Pi_E$ ), both in nominal terms. Given the nominal interest rate and the current outstanding stock of corporate debt ( $D$ ), we can write:

$$\Pi_E = \Pi - iD$$

where  $iD$  denotes debt-servicing payments to rentiers. Deflating by the price level yields:

$$\Pi_{ER} = \Pi_R - iD_R$$

where an  $R$ -subscript denotes the real value of a variable. Finally, dividing through by the capital stock,  $K$ , we arrive at:

$$r_E = r - i\lambda$$

where  $\lambda = D_R/K$  denotes the ratio of corporate debt (in real terms) to the capital stock. Following Hein (2006) and Lavoie (1995),  $\lambda$  is assumed constant in the short run.<sup>15</sup>

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<sup>14</sup> The interest rate in question is usually the *real* interest rate, but note that as long as it obeys the Taylor principle (on which, see Clarida et al, 1999, p.1701), the central bank can change the real interest rate by means of its control over the *nominal* interest rate.

<sup>15</sup> This assumption is not altogether innocuous. See Appendix I.

We can now proceed to describe the income-generating process in our fully articulated PK model. We begin with a modified neo-Kaleckian investment function of the form:

$$g = \gamma + g_u u + g_r (r - i\lambda) \quad [12]$$

where  $g$  is the rate of accumulation. Equation [12] describes the rate of accumulation (and hence, since  $v$  is constant, the rate of growth of real output) as being determined by the rate of capacity utilization and the rate of enterprise profits. Note that in equation [12], the *nominal* interest rate influences the *real* rate of growth. This dependence of a real outcome on a monetary variable is, of course, an inherently Keynesian result. Intuitively, it results from the Kaleckian notion that increases in the nominal interest rate squeeze firms' cash flows, and hence their ability to finance investment expenditures. Indeed, the "rate of enterprise profits"  $r_E = r - i\lambda$  as derived earlier is properly interpreted as the "real cash flow rate".<sup>16</sup> Equation [12] is thus congruent with the empirical evidence provided by, *inter alia*, Fazzari and Mott (1986–7), Fazzari and Athey (1987), Fazzari et al (1988) and Ndikumana (1999), who show that firms' real cash flow influences the level of investment spending.

Our model of the income-generating process is completed by the addition of two further equations:

$$g^s = s_\pi r \quad [13]$$

and:

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<sup>16</sup> I am indebted to Marc Lavoie of the University of Ottawa for drawing this to my attention.

$$r = \frac{(1-\omega)u}{v} \quad [14]$$

where  $g^s$  is the rate of growth of savings and  $s_\pi$  is the propensity to save out of profits. Equation [13] is the standard Cambridge equation relating the rate of growth of saving to the rate of profit, and equation [14] is true by definition.<sup>17</sup>

Utilizing equation [14], we can re-write [12] and [13] as:

$$g = \gamma - g_r i \lambda + \left( g_u + \frac{g_r (1-\omega)}{v} \right) u \quad [12a]$$

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<sup>17</sup> It was noted earlier that:

$$\omega_F = 1 - \frac{r^T v}{u_n}$$

Given that:

$$r = r_E + i \lambda$$

we can write:

$$r^T = r_E^T + i_n \lambda$$

where  $i_n$  is the *normal* rate of interest on which firms base their calculation of the target rate of return. It follows that:

$$\omega_F = 1 - \frac{(r_E^T + i_n \lambda) v}{u_n}$$

Hence  $\omega_F$  remains constant as long as  $r_E^T$ ,  $i_n$ ,  $\lambda$ ,  $v$ , and  $u_n$  are treated as exogenously given.

Note, however, that if  $i_n$  is allowed to vary with  $i$ , then  $\omega_F$  (and hence the mark up and the price level) will also vary with  $i$ . This would produce the positive correlation between prices and interest rates known as ‘‘Gibson’s paradox’’ (see Hannsgen, 2006). Essentially, the assumption in this paper that  $i_n$  is given amounts to the claim that, in an environment of administered pricing (and absent staggered pricing by firms), the Gibson paradox will not be observed in the short run. It may, however, re-emerge over a longer time horizon if  $i_n$  eventually adjusts in response to discrepancies between  $i_n$  and  $i$ . Note that this would render  $\omega_F$  sensitive to changes in  $i$  in the long run, and hence set up a positive relationship between  $i$  and  $p^*$  via equation [11].

and:

$$g^s = \frac{s_\pi(1-\omega)u}{v} \quad [13a]$$

Steady state equilibrium is achieved when  $g = g^s$  which, on the basis of [12a] and [13a], yields an expression for the equilibrium rate of capacity utilization of the form:<sup>18</sup>

$$u^* = \frac{(\gamma - g_r i^* \lambda)v}{(s_\pi - g_r)(1 - \omega^*) - g_u v}$$

Recalling the equilibrium result  $\omega^* = \omega_F$  derived from the inflation process, this expression can,

in turn, be re-written as:

$$u^* = \frac{(\gamma - g_r i^* \lambda)v}{(s_\pi - g_r)(1 - \omega_F) - g_u v} \quad [15]$$

The equilibrium in equation [15] derived from the sub-model in equations [12]–[14] will be stable if:

$$(s_\pi - g_r)(1 - \omega_F) - g_u v > 0$$

which can be expressed as the familiar condition:

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<sup>18</sup> Note that [10a] and [11a] can also be solved for the equilibrium rate of growth using this same equilibrium condition. As intimated earlier, the equilibrium rate of growth is ignored here by virtue of the strictly short run nature of the model under construction.

$$s_\pi > g_r + \frac{g_u v}{(1 - \omega_F)} \quad [16a]$$

In other words,  $u^*$  is stable if the rate of growth of investment in [12a] is less responsive to changes in capacity utilization than the rate of growth of savings in [13a]. Note, however, that given [16a], in order for the equilibrium in [15] to be positive (and therefore economically meaningful, given that  $u \in [0, 1]$  by definition), we also require:

$$\gamma - g_r i^* \lambda > 0$$

or:

$$\gamma > g_r i^* \lambda \quad [16b]$$

Finally, it is also worth noting at this point that given [16a] and [16b], the sub-model in equations [12]–[14] will always be stagnationist (increases in the wage share will unambiguously raise aggregate demand and hence the rate of capacity utilization). This is confirmed by the following result, derived from equation [15]:<sup>19</sup>

$$\frac{\partial u^*}{\partial (1 - \omega_F)} = \frac{-(s_\pi - g_r) \gamma v}{[(s_\pi - g_r)(1 - \omega_F) - g_u v]^2} < 0 \quad [17]$$

As will become clear in section 3 below, these results have important implications for the conduct of policy in our model.

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<sup>19</sup> Note that, since  $g_u v / (1 - \omega_F) > 0$ , it follows from [16a] that  $s_\pi > g_r$ .

### 3. Model Solution and the Design of Non-Monetary Policy Interventions

#### *i) General equilibrium outcomes*

We are now in a position to state our complete model and to explore the possibilities for and ramifications of non-monetary policy interventions therein. The three key equations from the preceding section describing, respectively, the conduct of monetary policy, the inflation process and the income generating process are:

$$i^* = p^* \quad [4a]$$

$$p^* = \frac{\mu_u u^* + \mu_Z Z}{1 - (\mu_u u^* + \mu_Z Z)} (\omega_W - \omega_F) \quad [11]$$

$$u^* = \frac{(\gamma - g_r i^* \lambda) v}{(s_\pi - g_r)(1 - \omega_F) - g_u v} \quad [15]$$

Note that, by combining [4a] and [15], we arrive at:

$$u^* = \frac{(\gamma - g_r p^* \lambda) v}{(s_\pi - g_r)(1 - \omega_F) - g_u v} \quad [18]$$

which, in conjunction with [11], gives us two equations in  $u^*$  and  $p^*$ . We can now determine the “general equilibrium” values of  $u^*$  and  $p^*$  – i.e., the values of  $u^*$  and  $p^*$  that are mutually consistent with [11] and [18]. This exercise, coupled with the determination of the implied value of  $i^*$  from

[4a], is illustrated in Figure 1 below.<sup>20</sup>

[FIGURE 1 GOES HERE]

ii) *Macroeconomic policy and the real economy: output targeting and the importance of fiscal policy*

Figure 1 depicts a general equilibrium that will result if there is no non-monetary policy intervention in the economy.<sup>21</sup> However, the government may have policy objectives with respect to the real economy (expressed in terms of  $u$ ) and the rate of inflation that need not automatically be satisfied (indeed, are unlikely to be satisfied) by the general equilibrium configuration depicted

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<sup>20</sup> Note that the slopes of the schedules in Figure 1 correspond to the facts that, from [18]:

$$\frac{\partial u^*}{\partial p^*} = \frac{-g_r \lambda v}{(s_\pi - g_r)(1 - \omega_F) - g_u v} < 0$$

and:

$$\frac{\partial^2 u^*}{\partial p^{*2}} = 0$$

whilst from [11]:

$$\frac{\partial p^*}{\partial u^*} = \frac{\mu_u (\omega_W - \omega_F)}{[1 - (\mu_u u^* + \mu_Z Z)]^2} > 0$$

and:

$$\frac{\partial^2 p^*}{\partial u^{*2}} = \frac{2\mu_u^2 (\omega_W - \omega_F)}{[1 - (\mu_u u^* + \mu_Z Z)]^3} > 0$$

<sup>21</sup> As in any macroeconomic model, some form of *monetary* policy intervention is always required: either the central bank sets the quantity of money in circulation (as in most conventional macroeconomic models) or else it sets the nominal short-term interest rate (as in models, such as the one developed here, that practice macroeconomics without the LM curve).

in Figure 1.<sup>22</sup> Hence consider first the possibility of the government having a target rate of capacity utilization,  $u^T$ .<sup>23</sup> Given that monetary policy is dedicated to the pursuit of a fair rate of interest, policy makers must resort to a non-monetary tool to pursue this real activity target. In terms of the structure of the model developed above, an obvious candidate is fiscal policy. Hence suppose that the coefficient  $\gamma$  in equation [12] represents the general government deficit relative to the capital stock. Suppose further that  $\gamma$  is adjusted according to the policy reaction function:<sup>24</sup>

$$\dot{\gamma} = -\theta(u - u^T) \quad [19]$$

If  $u^* < u^T$  initially, then the reaction function in [19] will increase the value of  $\gamma$ , thereby shifting the  $u$ -schedule originally depicted in Figure 1 up until the general equilibrium value of  $u$  is consistent with  $u^T$ . The new equilibrium that will result is depicted in Figure 2, which illustrates that the policy intervention described above will also (*ceteris paribus*) imply new (higher) general equilibrium values of  $p$  and  $i$ .<sup>25</sup>

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<sup>22</sup> Note that there are no “natural” values of  $u$ ,  $p$  or  $i$  in the general equilibrium of our model that constrain or render unnecessary such policy objectives.

<sup>23</sup> Under the assumptions of our model, this amounts to a target rate of unemployment equivalent to:

$$U^T = 1 - \frac{u^T lK}{vL}$$

and a target level of real output,  $y$ , given by:

$$y^T = \frac{u^T K}{v}$$

<sup>24</sup> Note that in [19], it is the rate of change of the government’s fiscal stance that is important, rather than whether the government runs a deficit or surplus at any point in time.

<sup>25</sup> It is because of this that the increase in  $u$  consistent with equilibrium in Figure 2 is less than the initial increase in  $u$  that results from an increase in  $\gamma$  with  $p = p^*$  unchanged. In other words,

[FIGURE 2 GOES HERE]

The result depicted in Figure 2 corroborates the claims of authors such as Arestis and Sawyer (2003, 2004), who argue that too little attention is currently paid to the contribution that fiscal policy can make to macroeconomic policy making. This inattention is unwarranted even in NC-type models that embody unique, supply-determined equilibrium values of real variables (see, for example, Taylor, 2000b, Setterfield, 2007b). In the PK economy outlined in section 2, however, fiscal policy is rendered all the more important by the capacity of aggregate demand conditions to permanently affect real performance. The significance of the fiscal policy results in Figure 2 are further enhanced by the greater ability of the public sector (relative to the corporate and especially the household sectors) to bear the burden of accumulating debt that inevitably accompanies deficit spending (see, for example, Palley, 2002).

*iii) The role of incomes policies – and the benefits of inflation targeting?*

In light of the importance that policy makers have attached to inflation over the past twenty five years, it is reasonable to suppose that the government will wish to engage in some form of inflation targeting, rather than passively accepting whatever general equilibrium value of  $p$  is determined as a “residual” in the pursuit of a target level of real activity (as in Figure 2). Note that inflation targeting could, in principle, be pursued by using fiscal policy, this time to *depress* real

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our model exhibits a partial interest rate crowding out effect. However, this is not because of a “scarcity” of money created by an exogenous money supply – as noted earlier, the quantity of money in circulation is endogenous. Instead, the partial interest rate crowding out effect is a policy artefact: increasing utilization raises the bargaining power of workers and hence the rate of inflation, which raises the interest rate via the central bank’s IROP (the Pasinetti rule). This latter development depresses  $u$ , partially offsetting the increase in  $u$  with which we began.

activity and thus the rate of inflation. Hence if:

$$\dot{\gamma} = -\psi(p - p^T) \quad [20]$$

where  $p^T$  denotes the target rate of inflation, then  $p^* > p^T$  initially will provoke reductions in  $\gamma$ , causing the  $u$ -schedule originally depicted in Figure 1 to shift down. This process will continue until the general equilibrium rate of inflation is equal to  $p^T$ , as depicted in Figure 3. Figure 3 also reveals the obvious pitfall of this conventional form of inflation targeting:<sup>26</sup> unless the general equilibrium value of  $u$  implied by  $p^T$  is exactly equal to  $u^T$  (which is not the case in Figure 3, where  $u^{**} < u^T$ ), policy makers will not succeed in reconciling their inflation and real activity targets. Instead, using fiscal policy to depress the economy in pursuit of low inflation means that the level of real activity is now a residual, determined by the value of the inflation target. The problem here is a familiar one: with two policy objectives but only one policy instrument, policy makers fall foul of the famous Tinbergen (1952) principle.<sup>27</sup>

[FIGURE 3 GOES HERE]

Fortunately, our fully articulated PK model suggests a number of ways in which this problem can be solved by means of recourse to less conventional approaches to inflation targeting, all of which essentially involve the pursuit of some form of incomes policy.<sup>28</sup> For example, the state can

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<sup>26</sup> The process of inflation targeting is described as *conventional* here because it is based on a policy intervention that aims, in the first instance, to depress demand conditions.

<sup>27</sup> See also Michl (2006) on the pitfalls of inflation targeting suggested by the Tinbergen principle.

<sup>28</sup> Incomes policies are defined in very general terms here as “formal and/or informal institutions that frame and mediate aggregate wage and price setting behaviour in such a way as to reduce conflict over income shares and better reconcile conflicting income claims” (Setterfield, 2007a, p.129).

pursue its inflation target by seeking to change the institutional structure of the labour market (captured by the variable  $Z$  in equation [6]) in ways that reduce the income and employment security of workers and hence (per equation [6]) the power of workers *vis a vis* firms in the wage bargain.<sup>29</sup> Formally, this can be achieved by means of the policy reaction function:

$$\dot{Z} = -\eta(p - p^T) \quad [21]$$

The consequences of this policy regime are illustrated in Figure 4. Assuming that  $p^* > p^T$  initially, the value of  $Z$  is first lowered as a result of [21]. This shifts the  $p$ -schedule to the left, reducing the rate of inflation associated with any given capacity utilization rate, as illustrated in Figure 4.<sup>30</sup> At this point, it is worth remarking on a second important consequence of this policy intervention: other things being equal, it *raises* the rate of capacity utilization (from  $u^* = u^T$  to  $u'$  in Figure 4). The intuition behind this result is straightforward. *Ceteris paribus*, a reduction in the equilibrium rate of inflation will reduce the equilibrium rate of interest (in accordance with the central bank's IROP, based on Pasinetti's fair interest rate rule), raising the rates of enterprise profits, accumulation and hence capacity utilization. The upshot of this result is that in the fully articulated PK model developed here, inflation targeting can be *conducive* to real economic performance. The lower the inflation target, the lower the equilibrium rate of inflation becomes and hence – as a result of the process described above – the *higher* will be the equilibrium rate of capacity utilization.

Of course, if the state continues to pursue its fiscal policy in the basis of equation [19], and

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<sup>29</sup> Policies designed to achieve this end might include changing labour law to increase the ease with which firms can fire workers, confronting (in the hope of defeating) major public sector trade unions, and so forth. See Setterfield (2006, 2007a) for further discussion.

<sup>30</sup> Reducing the value of  $Z$  will also make the  $p$ -schedule flatter, as depicted in Figure 4.

if  $u^* = u^T$  initially as in Figure 4, the developments outlined above will provoke a reduction in  $\gamma$  which will shift the  $u$ -schedule down, until a general equilibrium is achieved with  $p^{**} = p^T$  and  $u^{**} = u^* = u^T$  (see Figure 4). In this case, the benefits of inflation targeting for the real economy accrue not in the form of a higher level of real activity, but as a fiscal dividend captured by the state. According to Setterfield (2006, 2007a), the form of inflation targeting captured in [21] has been implicitly practiced in the US economy since the early 1980s. The costs of reconciling low inflation with high (relative to potential) real activity associated with this policy fall solely on workers, who experience increased employment and income insecurity – as a result of which Setterfield (2006) refers to the policy regime as “balancing the macroeconomic books on the backs of workers”. Note that in the context of the fully articulated PK model developed in this paper, this policy regime – which not only produces low inflation and unemployment, but also low interest rates and a fiscal dividend for the state – provides a PK rationalization of the outcomes in the US economy during the 1990s that are commonly associated with “Rubinomics”.<sup>31</sup>

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<sup>31</sup> “Rubinomics” derives its name from former US Treasury Secretary Robert Rubin. Rubin – who attached high priority to federal government budget deficit reduction – was one of the main architects of US economic policy during the late 1990s, a period during which the US experienced low interest rates, low unemployment, low inflation and federal government budget surpluses.

Note that, given our interpretation of  $\gamma$  as the general government deficit relative to the capital stock, it is not strictly possible for the government to run budget surpluses in the model developed above since, as our analysis of the income-generating process in section 2(iii) revealed, we must observe:

$$\gamma > g_r i^* \lambda$$

This imposes a restriction on fiscal policy that certainly does not permit  $\gamma < 0$ . However, if we interpret  $\gamma$  more generally as:

$$\gamma = \gamma_G + \gamma_C$$

where  $\gamma_G$  now denotes the general government deficit relative to the capital stock, and  $\gamma_C$  represents the rate of corporate accumulation that is unrelated to either  $u$  or  $r$ , then  $\gamma > 0$  requires only that:

$$\gamma_C > -\gamma_G$$

[FIGURE 4 GOES HERE]

A second “unconventional” approach to inflation targeting suggested by our fully articulated PK model involves seeking to better reconcile the aspirations of workers and firms. Hence note that in Figure 1, the inflation costs associated with any given rate of capacity utilization along the  $p$ -schedule are sensitive to the value of the “aspiration gap”  $\omega_W - \omega_F$ : as is clear from inspection of equation [11], the equilibrium rate of inflation is increasing in the aspirations gap. Suppose, then, that in the pursuit of its inflation target, the state utilizes a policy reaction function of the form:

$$\dot{\Omega} = -\tau(p - p^T) \quad [22]$$

where  $\Omega = \omega_W - \omega_F$ . The consequences of manipulating the aspirations gap – in conjunction with the fiscal policy reaction function in [19] – will depend on whether  $\dot{\Omega} \neq 0$  is achieved by means of adjusting  $\omega_W$  or  $\omega_F$ .<sup>32</sup> It is possible in principle that either  $\omega_W$  or  $\omega_F$  could be judged extreme and therefore in need of adjustment, and in both cases the state can seek to address the problem either cooperatively (by seeking to persuade either workers or firms to moderate their aspirations in favour of aggregate economic performance) or coercively (by seeking to depress the aspirations of either party without their explicit acquiescence to this process).<sup>33</sup> If the state decides that  $\omega_W$  is extreme,

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which, if  $\gamma_G < 0$ , states that  $\gamma_C$  must exceed the size of the government’s budget surplus. Of course, ultimately we require  $\gamma_C > g_r \dot{i}^* \lambda - \gamma_G$  in order to ensure that  $u^* > 0$ . What all of this serves to illustrate is that public sector surpluses impose a burden on the private sector to engage in deficit spending – as observed in the US economy during the 1990s.

<sup>32</sup> Nothing precludes simultaneous adjustment of *both*  $\omega_W$  and  $\omega_F$ , of course, but this possibility is overlooked above for the sake of simplicity.

<sup>33</sup> See, for example, Setterfield and Lovejoy (2006) on the determinants of aspirations for intimations as to how this might be achieved.

so that [22] becomes:

$$\dot{\omega}_W = -\tau(p - p^T) \quad [22a]$$

then the consequences for the economy's general equilibrium are similar to those depicted in Figure 4. For our purposes, however, it is more interesting to consider the case where  $\omega_F$  is deemed extreme, so that [22] effectively becomes:

$$\dot{\omega}_F = \tau(p - p^T) \quad [22b]$$

Equation [22b] has several interesting properties. First, it draws attention to the fact that firm behaviour (rather than that of workers) can be the source of “excessive” inflationary pressure, a point that is sometimes overlooked in discussions of “cost-push” (or more generally, supply-side) accounts of the inflation process. Second, recalling our earlier result that  $\omega_F$  is a function of  $r^T$ , and the claim that  $r^T$  may be sensitive to many of the same factors that influence the parameter  $\phi$  in equation [7a] – including domestic concentration ratios and the degree of international competition – equation [22b] draws attention to the fact that competition policy may be an important instrument for inflation targeting. This, in turn, suggests that it may be appropriate at times to pursue an inflation target by means of policies that address conditions in the *goods* market, rather than policies that focus solely on conditions in the *labour* market. Finally, and most importantly for our purposes, equation [22b] has significant macroeconomic ramifications that make it qualitatively different from [22a] (the macroeconomic implications of which are, as noted above, similar to those of equation [21]). These are illustrated in Figure 5 below, which depicts the general equilibrium consequences of the interaction between equations [19] and [22b]. Once again, we begin from a position where  $u^* = u^T$  and  $p^* > p^T$  initially. The latter will now provoke  $\dot{\omega}_F > 0$  from [22b], as a result of which

the  $p$ -schedule shifts left, as illustrated in Figure 5.<sup>34</sup> As in the previous case depicted in Figure 4, the consequences of [22b] involve not only a reduction in inflation (from  $p^*$  to  $p'$ ), but also an increase in the rate of capacity utilization from  $u^*$  to  $u'$ , as lower inflation reduces the rate of interest (via the Pasinetti rule) and thus raises the rate of accumulation. But this time there is a second, positive effect of inflation targeting on real activity: by raising  $\omega_F$ , the policy intervention described above will cause the  $u$ -schedule to shift up, further increasing the rate of capacity utilization (from  $u'$  to  $u''$  in Figure 5).<sup>35</sup> The intuition behind this result is straightforward. Since  $\omega^* = \omega_F$ , and the income-generating process is stagnationist, [22b] is effectively redistributing income from profits to wages and, in the process, boosting aggregate demand and hence the level of real activity. Our earlier claim – that inflation targeting is *conducive* to real economic performance – is thus reinforced in the case where inflation targeting is pursued by means of the policy reaction function in [22b].

[FIGURE 5 GOES HERE]

To complete our analysis of developments in Figure 5, we must remember that due to equation [19],  $u > u^T$  will provoke a fiscal policy response as a result of which  $\gamma$  will be lowered and the  $u$ -schedule shifted down until, in general equilibrium, we observe  $u^{**} = u^* = u^T$  and  $p^{**} = p^T$ . Once again, then, the operation of [19] will ensure that the positive impact of inflation targeting on the level of real activity will be captured by the state in the form of a fiscal dividend.

#### 4. Conclusion

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<sup>34</sup> The slope of the  $p$ -schedule will also become flatter, as illustrated in Figure 5.

<sup>35</sup> Note that this shift in the  $u$ -schedule will also cause an increase in inflation from  $p'$  to  $p''$ , and will be accompanied by a steepening of the  $u$ -schedule itself. Both of these developments are illustrated in Figure 5.

The fully articulated PK model developed in this paper identifies three policy objectives (income distribution, inflation, and the level of real activity) that must be pursued with three policy instruments (monetary policy, fiscal policy, and incomes policy). This provides a marked contrast with the one objective (inflation) – one instrument (monetary policy) NC model. Moreover, the PK model yields a number of interesting and important policy results. For example, it explicitly demonstrates the possibility of reconciling concerns about the level and distribution of income with the pursuit of an inflation target. Indeed, the model shows that if monetary policy is conducted in conformity with Pasinetti’s fair interest rate rule, inflation targeting can lead to *higher* rather than lower levels of real activity. Specifically, the lower is the inflation target, the lower will be the rate of interest (thanks to the Pasinetti rule) and hence the higher (*ceteris paribus*) the rate of capacity utilization. This positive impact on real activity of inflation targeting is reinforced in the event that inflation is lowered by means of moderating firms’ target rate of return. This is essentially because the underlying income-generating process is stagnationist. Hence aggregate demand is boosted not just by the reduction in interest rates that follows from lower inflation, but by the very tool that is used to reduce inflation, which involves redistributing income towards wages.

Perhaps most importantly of all, the results summarized above reinforce Smithin’s (2004) claim that macroeconomic policy activism contributes to the social construction of the economy. They suggest that even if certain intrinsic features of the economy (such as the importance of effective demand in the determination of real activity) must be treated as “fundamental”, with the appropriate mix of policy interventions the economy can, in principle, be socially constructed to operate in a way that would suit the mores (with respect to the utilization of productive resources and the distribution of income, in particular) of Post Keynesian economists.

APPENDIX I: On the behaviour of  $\lambda$

We begin our analysis with the following flow of funds equation for firms:

$$\Pi - iD + \dot{D} = P\Delta K + E$$

where, assuming the absence of depreciation,  $P\Delta K$  denotes investment spending and  $E$  denotes distributed earnings. Note that we are assuming for simplicity that any corporate earnings that are *not* distributed are used to fund the purchase of new capital or service outstanding debt – i.e., firms do not amass retained earnings. It follows from the expression above that:

$$\frac{\Pi}{PK} - \frac{iD}{PK} + \frac{\dot{D}}{PK} = \frac{P\Delta K}{PK} + \frac{E}{PK}$$

or:

$$r - i\lambda + \lambda\hat{D} = g + e$$

since  $\lambda = \frac{D_R}{K} = \frac{D}{PK}$  and  $\frac{\dot{D}}{PK} = \frac{\dot{D}}{D} \frac{D}{PK} = \lambda\hat{D}$ . Solving the expression above for  $\hat{D}$  yields:

$$\hat{D} = \frac{1}{\lambda}(g + e + i\lambda - r) \quad [A1]$$

Meanwhile, it follows from the definition of  $\lambda = \frac{D}{PK}$  that:

$$\dot{\lambda} = \lambda(\hat{D} - p - g) \quad [A2]$$

Substituting [A1] into [A2] yields:

$$\dot{\lambda} = g + e - r + \lambda(i - p - g) \quad [A3]$$

In order for  $\lambda$  to remain constant, we must observe  $\dot{\lambda} = 0$  which, from [A3], implies:

$$\lambda = \frac{r - g - e}{i - p - g} \quad [A4]$$

In other words, if we take  $e$  as given, the value of  $\lambda$  is endogenously determined by the equilibrium values of  $r$ ,  $g$ ,  $i$ , and  $p$  derived from our model. But suppose instead we insist on setting  $\lambda = \bar{\lambda}$ , where  $\bar{\lambda}$  is an exogenously given constant. Re-arranging [A4] yields:

$$e = r - g - \bar{\lambda}(i - p - g) \quad [A5]$$

In other words, we can sustain the assumption that  $\lambda$  is an exogenously given constant *regardless* of the precise equilibrium values of  $r$ ,  $g$ ,  $i$ , and  $p$  if we treat  $e$  as a “residual”, the value of which is determined in [A5].

Note, however, that the discussion above has important implications for saving behaviour. To see this, we begin by referring back to our initial flow of funds equation, and writing:

$$\Pi = iD + E + \xi P\Delta K \quad [A6]$$

where  $\xi$  is the proportion of current investment spending that firms fund from current earnings. It follows from [A6] that:

$$\begin{aligned} r &= i\lambda + e + \xi g \\ \Rightarrow \xi g &= r - i\lambda - e \end{aligned} \quad [A7]$$

Now note that it also follows from [A6] that total saving in the economy can be written as:

$$S = s(iD + E) + \xi P\Delta K \quad [A8]$$

where  $s$  is the (assumed common) propensity to save of capitalist and rentier households. On the basis of equation [A8], we can write:

$$g^s = s(i\lambda + e) + \xi g$$

and substituting [A7] into this last expression, we arrive at:

$$g^s = r - (1 - s)(i\lambda + e) \quad [A9]$$

Finally, note that we now require  $s = 1$  in order to write:

$$g^s = s_\pi r \quad , \quad s_\pi = 1$$

which is the familiar Cambridge equation utilized in the main body of the paper. In other words, we must assume a propensity to save of one on the part of rentier and capitalist households – and hence an aggregate propensity to save out of profits equal to one – in order to reconcile the Cambridge equation with the flow of funds equation on which our justification for assuming  $\lambda = \bar{\lambda}$  is based. Intuitively, this is because with  $s = 1$ , the same proportion of gross profit income is saved, regardless of whether it is retained by corporations to fund some part of current investment expenditures, or accrues to rentier/capitalist households in the form of interest payments/distributed earnings.

What all this illustrates is the restrictive nature of the behavioural assumptions necessary to reconcile our treatment of  $\lambda$  as an exogenous constant with the analytical structure of the rest of our model. Clearly, then, the assumption that  $\lambda$  can be taken as given – even in the short run – should be treated only as a first approximation.

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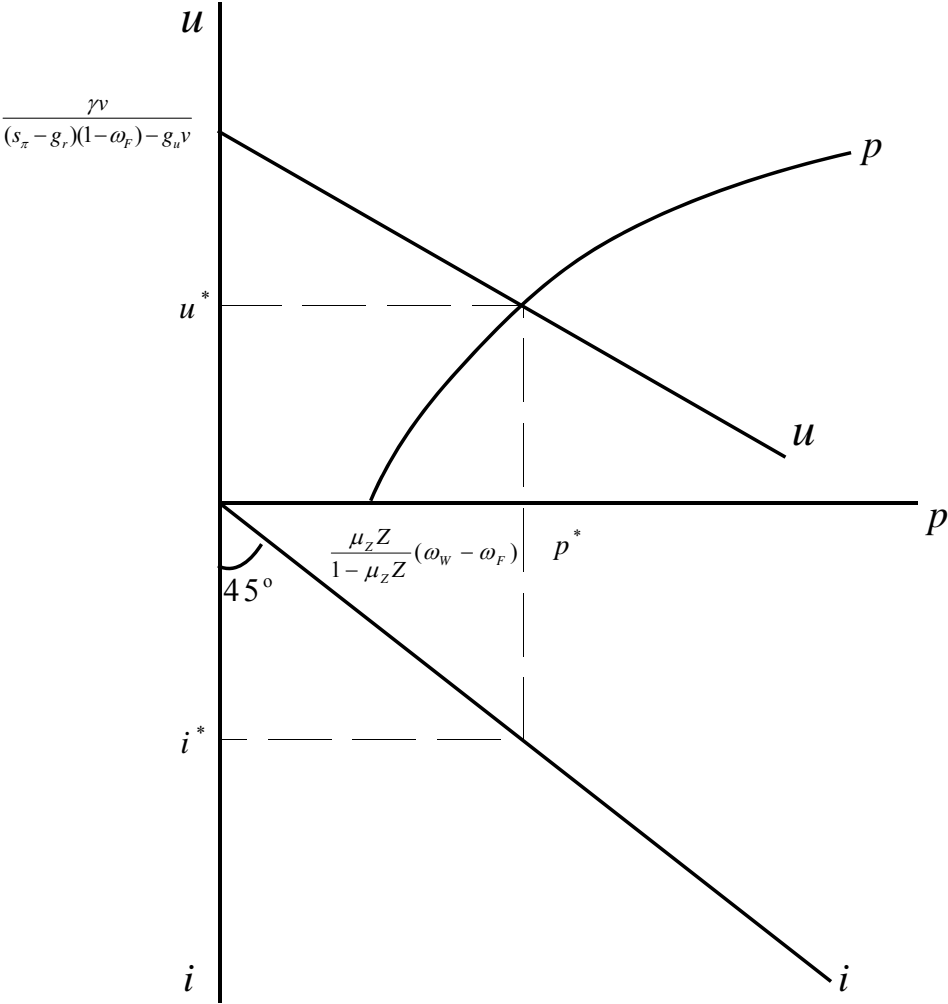
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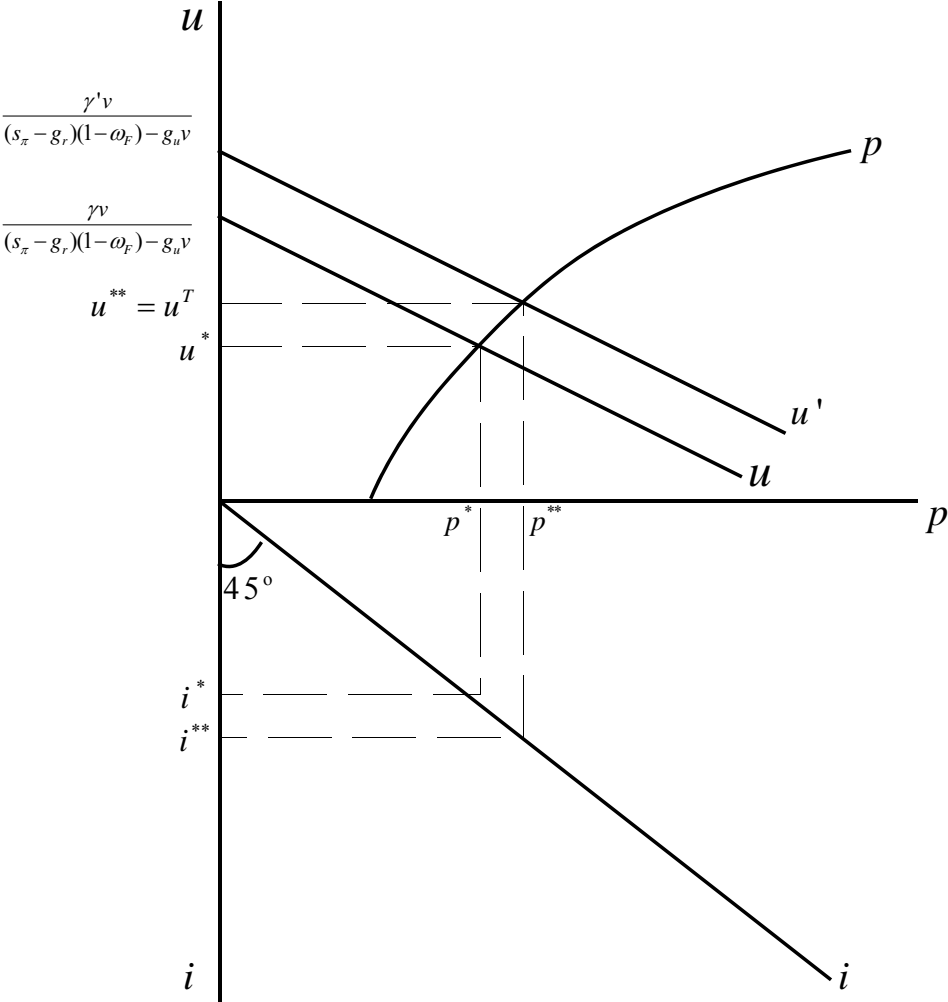
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**Figure 1: Determination of the General Equilibrium Values of  $i, p$  and  $u$ .**



**Figure 2: Achieving a Target Level of Real Activity By Means of Fiscal Policy**



**Figure 3: The Pitfalls of Lowering Inflation by Depressing Real Activity**

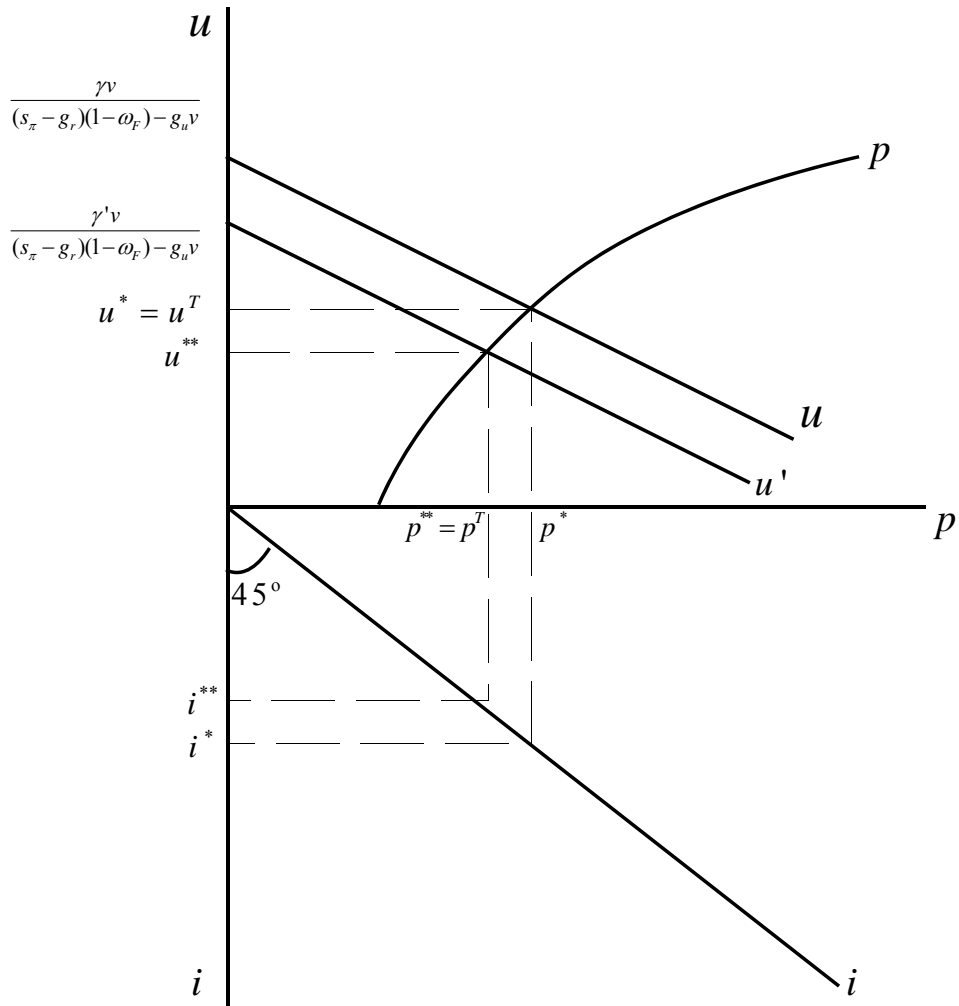


Figure 4: Balancing the Macroeconomic Books on the Backs of Workers

