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The middle class in macroeconomics and growth theory: a three-class neo-Kaleckian–Goodwin model

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This paper presents a three-class growth model with labour market conflict. The classes are workers, a middle-management middle class and a 'top' management capitalist class. The model introduces personal income distribution that supplements conventional concerns with functional income distribution. Endogenously generated changes in personal income distribution can generate endogenous shifts from profit-led to wage-led regimes and vice versa. A three-class economy generates richer patterns of class conflict because the middle class has shared interests and conflicts with both capitalists and workers. Changes that benefit the middle class do not necessarily increase growth or employment or benefit workers.

Key words: Middle class, Class conflict, Economic growth, Income distribution, Managerial pay, Bargaining power
JEL classifications: E12, O33, O41

1. Introduction: the missing middle class

The Great Stagnation that has followed the Great Recession of 2007–09 has generated increased interest in the macroeconomic effects of income distribution (Palley, 2012A; van Treek and Sturn, 2012). Hand in hand with this new interest in income distribution has come a new political rhetoric and interest in the middle class, which is now repeatedly referred to as the 'engine' of economic growth. For example, on 1 August 2012, the well-connected Center for American Progress in Washington, DC held a conference titled '300 Million Engines of Growth: The Middle Class and the US Economy'. However, this interest in the middle class is not matched by economic theory, which is eerily quiet on the subject of class. Thus, within mainstream theory, class is excluded either via adoption of the concept of the representative consumer or via theories of consumption that treat households as having the same propensity to consume.

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This paper aims to begin the process of filling the gap in theory by developing a three-class neo-Kaleckian–Goodwin model of growth and distribution. The three classes consist of workers, middle management that is identified with the middle class and 'top' management that is identified with the capitalist or upper class. The paper builds upon an earlier paper by Palley (2013A) on a two-class model with workers and a composite capitalist manager class.

An important contribution of the paper is the political economy that results from a three-class world. A two-class world generates simplistic class conflict. A three-class world is characterised by more complicated political conditions in which the middle class is pulled between siding with workers and siding with capitalist top managers, and the middle class has conflicts with both. By starting with a better description of sociological reality, the model delivers better macroeconomic and political insight. Indeed, the middle class, which is currently politically celebrated, can be the cause of problems.

For purposes of connecting to the real world, the top manager class is identified with the top 1% of the income distribution, the middle manager class is identified with the next 19% and the worker class is identified with the bottom 80%. This is a narrower definition of the middle class than is used in political conversation, but it has economic salience. Table 1 shows a decomposition of US private sector employment in September 2012. Just over 80% of workers were classified as production and non-supervisory. Table 2 provides a decomposition of income and wealth shares; both are heavily concentrated in the top 20%, and especially the top 1%. Income and wealth fall off rapidly beyond the top 20th percentile.

The above definition of the middle class gives renewed meaning to the term that current popular discourse has rendered almost meaningless by claiming 'we are all middle class'. This meaninglessness is reflected in the recent (2013) US fiscal cliff debate in which Republicans defined the middle class as people with incomes of less than one million dollars and Democrats defined it as those with incomes of less than two hundred and fifty thousand dollars. Current usage is lifestyle focused, whereas the paper proposes a capital ownership perspective. This generates a much smaller middle class that is best conceptualised in terms of a pyramid. As shown in Figure 1, at the top is a small triangle representing the capitalist class; below that is a layer representing the

Table 1. *Composition of US private sector employment, September 2012*

Total private sector employment	111.5 million	100%
Production and non-supervisory workers	92.1	82.6
Managerial employees	19.4	17.4

Source: Bureau of Labor Statistics (2012), Tables B-1 and B-6.

Table 2. *Distribution of income and wealth in the USA*

	Bottom 80%	Top 20%	Top 1%
Income share in 2007[1]	40%	60%	21%
Wealth share in 2010[2]	19.5%	80.5%	30.4%

Sources: 1 = Congressional Budget Office Study (2011). 2 = Mishel *et al.* (2012), Table 6.6.

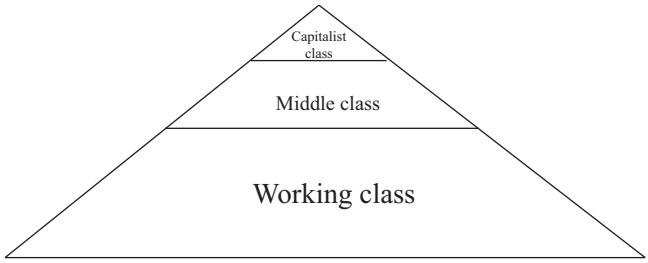


Fig. 1. *Class structure of capitalist economies.*

middle class; and below that is a larger layer representing the working class. Class sizes are very unequal and the middle class is sandwiched between the capitalist and working classes. However, contrary to the conventional representation, the middle class is not the largest class and nor does it even contain the median income household.

2. Relation to existing literature

The model that is presented in the next section builds on five different strands of research. The core first strand is the neo-Kaleckian growth model developed by authors such as Rowthorn (1982), Taylor (1983), Dutt (1984) and Lavoie (1995). Growth is driven by capital accumulation, which in turn depends positively on the rate of profit and the rate of capacity utilisation. The distribution of income is therefore critical for growth, as is the level of economic activity.

The second strand of research concerns the supply side and the endogeneity of technical progress function. This line of research originates with the ideas of Verdoorn (1949) and Kaldor (1957), which have become the foundation stone of Keynesian endogenous growth theory.[1]

The third strand of research comes from Dutt (2006) and Palley (2012B), who introduce labour markets. In steady state, employment and the labour force must grow at the same rate to ensure a constant unemployment rate. Moreover, labour market conditions exert critical growth effects on both the demand and supply sides of the economy.[2]

The fourth strand of literature concerns the role of wealth distribution (Dutt, 1990; Palley, 2012C). Wealth ownership is a critical factor for aggregate demand (AD) as it determines the distribution of profit income across household classes, which in turn affects demand because of differences in the propensity to consume across classes. In two-class models in which workers consume all their income, wealth is entirely owned by the capitalist class, thereby finessing the wealth distribution issue.

[1] An early contribution was Palley (1996, 1997), who models technical progress as depending on capacity utilisation, the rate of accumulation and the capital stock. More recent applications include Naastepad (2006), Naastepad and Storm (2006/07) and Hein and Tarassow (2010), who have technical progress depend on capacity utilisation and income distribution. Rada (2007) models a two-sector developing economy in which technical progress is impacted by output growth, wage growth and employment growth.

[2] Dutt (2006) presents a model in which the employment rate is indeterminate, whereas the employment rate is determined in Palley (2012B). This difference reflects different specifications of the impact of labour market conditions on induced technical progress.

In three-class models in which two classes save, wealth distribution cannot be finessed and needs to be endogenously determined.

The fifth strand of research concerns the wage bill and managerial pay. Kalecki (1970) noted the importance of managers and treated their pay as an exogenously given deduction from surplus. Palley (2013A) presents a two-class model with workers and a capitalist manager class in which managerial pay is part of the wage bill and the division of the wage bill between workers and capitalist managers depends on employment conditions. The current paper expands that earlier model to have three classes. It uses Kalecki's mechanism to determine top managers' pay and wage bill division conflict to determine middle managers' pay.[3] The outcome of the wage bill division conflict is impacted by the state of the labour market, which is what warrants the link to Goodwin (1967).[4]

The structure of the proposed model is illustrated in Figure 2. The top half of the figure represents the conventional neo-Kaleckian growth model, which embodies a causal loop between AD, capacity utilisation, income distribution and capital accumulation. Now, there is the addition of a distribution of wealth channel running from the functional distribution of income to AD. Capital accumulation affects the rate of productivity growth, reflecting the impact of endogenous technical progress based on Kaldor's (1957) concept of the technical progress function. The rate of capital accumulation and technical progress impact the employment rate, and employment conditions feed back to impact the character of innovation and the pace of labour productivity growth. This is the labour market balancing mechanism identified by Dutt (2006) and Palley (2012B). Finally, the employment rate impacts wage bill division between

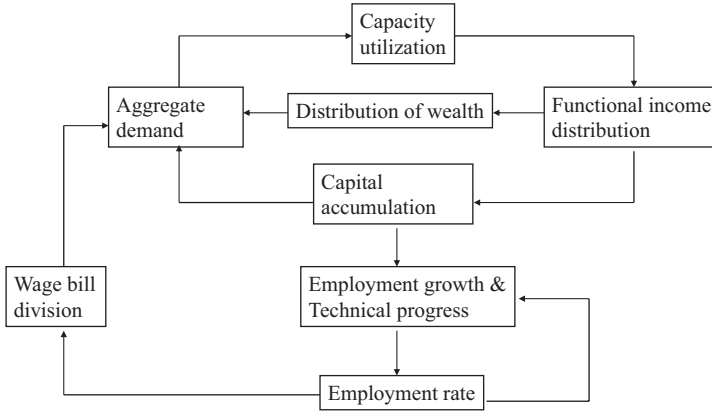


Fig. 2. *Structure of the model.*

[3] Managerial pay has long been an issue of interest for post-Keynesians, but it has been treated as exogenously determined. Palley (2005) emphasises the significance of the division of managerial pay for AD. Lavoie (2009) also examines the issue of managerial pay, but his focus is the cyclical behaviour of the markup given target return pricing and fixed managerial costs. The current paper endogenises the division of the wage bill and focuses on the AD implications of wage bill division.

[4] Goodwin's (1967) model is a cyclical model, whereas the current model is not. Additionally, Goodwin emphasises profit share conflict and cyclical growth is driven by full employment profit-squeeze. That mechanism can be included in the current model by making the profit share a function of the employment rate. However, for purposes of simplicity it is excluded from the current paper.

middle managers and workers (Palley, 2013A), thereby impacting AD. This impact on AD provides a point of entry for labour market conflict and bargaining power into the neo-Kaleckian model, thereby adding traditional Goodwin (1967)–Marx class conflict over income distribution centred on the labour market. However, though the division of the wage bill involves traditional labour market conflict, the functional distribution of income remains determined by firms' monopoly power in accordance with standard neo-Kaleckian theory.

3. The model

The model economy consists of six segments describing the following: the production side; the determination of prices and the functional distribution of income; the division of the wage bill; the goods market and the determination of AD; the labour market and the determination of the employment rate; and the determination of the distribution of wealth.

The first segment is the production side of the economy, which is described as follows:

$$Y = h^{\text{Min}}\left(\kappa K, A\lambda N, A\lambda M/\alpha, A\lambda T/\gamma\right) \qquad 0 < h < h^{\text{Max}} \tag{1}$$

$$M = \alpha N \qquad \alpha > 0 \tag{2}$$

$$T = \gamma M \qquad \gamma > 0 \tag{3}$$

$$g_{\text{Y}} = g_{\text{K}} \tag{4}$$

$$g_{\text{K}} = g_{\text{N}} + g_{\text{a}} \tag{5}$$

$$g_{\text{a}} = a(g_{\text{K}}, h, e, \chi) \qquad a_{\text{gK}} > 0,\ a_{\text{h}} > 0,\ a_{\text{e}} > 0,\ a_{\chi} > 0 \tag{6}$$

$$g_{\text{N}} = g_{\text{M}} = g_{\text{T}} \tag{7}$$

where Y is the output, h is the hours worked by workers, K is the capital stock, N is employed workers, M is middle managers, T is top managers, A is the state of technology, κ is the productivity of capital (output/capital ratio), λ is worker productivity (output/worker ratio), γ is the manger/worker ratio, g_{Y} is the output growth, g_{K} is the rate of capital accumulation, g_{N} is worker employment growth, g_{a} is the rate of labour-saving technical progress, e is the employment rate, χ is the exogenous shift factor affecting technical progress and g_{M} is middle manager employment growth and g_{T} is top manager employment growth.

Equation (1) is the production function in which output depends on hours of utilisation and inputs are capital, workers (measured in effective units) and managers. Equation (2) determines the middle manager/worker ratio. Equation (3) determines the top manager/middle manager ratio. Note that production is done by workers who supply hours. Managers are a necessary overhead and are employed in fixed proportions. Equation (4) determines the rate of growth of output, which is equal to the rate of capital accumulation. Equation (5) has the rate of capital accumulation equal to the rate of worker employment growth plus the rate of technical progress. Technical

progress is labour augmenting as only this is consistent with steady-state balanced growth (Uzawa, 1961). Equation (6) determines the rate of technical progress via an augmented Kaldor–Verdoorn technical progress function. Technical progress is a positive function of the rate of accumulation, hours (i.e. capacity utilisation), the employment rate and an exogenous shift factor.[5] Lastly, equation (7) determines the relationship between the growth of worker, middle manager and top manager employment.

The production structure is the same as in Palley (2012B), subject to the addition of two types of managerial employment. In addition to the distinction between production and supervisory labour (i.e. workers and managers), an important feature of the production structure is that capacity utilisation is modelled in terms of hours per employed worker. Firms can therefore increase output by increasing hours while holding employment constant. The capital stock is always in use but hours of utilisation vary, with variation of hours serving as a form of analogue inventory enabling firms to meet changes in demand. This contrasts with the conventional treatment in which low capacity utilisation is implicitly identified with having idle capital on hand for use by additional workers.

The analytical significance of introducing hours as the metric of capacity utilisation is that it cuts the link between capacity utilisation and employment, enabling output to vary while treating employment as a state variable. That in turn means the economy can have the same rate of capacity utilisation for different unemployment rates, reflecting the fact that capacity utilisation concerns excess supply within firms whereas the unemployment rate concerns excess supply within the labour market. This separation contrasts with the conventional model in which output can only increase if employment increases with output.[6]

The operation of the economy is as follows. Firms produce to meet demand, which is accomplished by variation of hours worked. From a modelling perspective, output and hours are jump variables determined by short-run forces. Employment, capital stock and the state of technology are state variables that evolve slowly.

The second segment of the model concerns pricing and determination of the functional distribution of income. This is done in accordance with Kaleckian markup pricing theory based on the following relations:

$$p = (1+m)W / A\lambda N \tag{8}$$

$$m = m(\psi) \qquad m_{\psi} > 0 \tag{9}$$

$$\sigma_{\omega} = 1/(1+m) = \omega(m) \qquad \omega_{\mathrm{m}} < 0 \tag{10}$$

$$\sigma_{\pi} = m/(1+m) = v(m) \qquad v_{\mathrm{m}} > 0 \tag{11}$$

$$\sigma_{\omega} + \sigma_{\pi} = 1 \tag{12}$$

[5] A positive effect of h on a is included for maximum generality. If tighter labour market conditions (e) increase productivity growth, increased hours of utilisation (h) might be expected to have similar directional effects.

[6] As noted in Palley (2012B, footnote 6), effort variation can perform a role similar to variation of hours in separating output from employment.

$$W_T = \mu\sigma_\pi \qquad 0 < \mu < 1 \tag{13}$$

$$\pi = (1-\mu)\sigma_\pi h\kappa \tag{14}$$

where p is the price level, m is the markup, W is the nominal wage bill, ψ is firms' monopoly power, σ_ω is the wage share, σ_π is the profit share, W_T is the wage compensation paid to top managers as a share of profits, μ is top managers' profit share and π is the profit rate after payments to top managers.

Equation (8) is the markup pricing formula whereby firms set price as a markup over average total unit labour costs. Those costs include workers' and middle managers' pay but not top managers' pay. Equation (9) determines firms' markup, which is a positive function of firms' exogenously given market power. Equations (10) and (11) determine the wage and profit shares as a function of the markup, while equation (12) is an accounting identity requiring the wage and profit shares to sum to unity. Equation (13) determines top managers' salaries as a share of profits. This is in accordance with Kalecki's (1970) treatment that specified top management pay as a deduction from surplus. The treatment of top manager pay contrasts with the treatment of middle managers' pay (see below), which is treated as a cost of production and included in the cost structure that enters into firms' markup pricing rule. Equation (14) defines the profit rate, which is reduced by the proportion of profits paid over to top management as remuneration.[7]

The third segment of the model concerns the division of the wage bill between workers and middle managers, which is as follows:

$$W = W_W + W_M \tag{15}$$

$$W_W = w_W h N_W \tag{16}$$

$$W_M = w_M M \tag{17}$$

$$W_W / (W_W + W_M) = \theta \tag{18}$$

$$W_M / (W_W + W_M) = 1 - \theta \tag{19}$$

$$\theta = \theta(e,h,x) \qquad 0 < \theta(e,h,x) < 1,\ \theta_e > 0,\ \theta_h > 0,\ \theta_x > 0 \tag{20}$$

where W_W is the worker nominal wage bill, W_M is the middle manager nominal wage bill, w_W is the worker hourly nominal wage, w_M is the manager salary, θ is the worker share of the wage bill, e is the employment rate and x is the exogenous institutional variable impacting workers' bargaining power.

Equation (15) defines the total nominal wage bill, which is split between payments to workers and middle managers. Equation (16) defines payments to workers, while equation (17) defines wage payments to middle managers. Workers are paid an hourly

[7] Mohun (2006) treats top managers' salaries as part of the profit share rather than the wage share and provides both a conceptual justification for this treatment and empirical data on its implications for calculations of the profit share.

wage whereas middle managers are paid a salary. Equation (18) defines the workers' share of the wage bill, while equation (19) defines middle managers' share of the wage bill. Equation (20) determines workers' share of the wage bill. This share is positively related to the employment rate (e), hours (h) and an institutional variable (x) affecting workers' labour market bargaining power.[8] The bargaining power variable is a catch-all that reflects features such as unionisation, minimum wages, employee protections and social insurance arrangements. It also reflects political characteristics such as the degree of class consciousness and worker solidarity.

Equation (20) is a wage share curve and it has a relation to the wage curve analysis of Blanchflower and Oswald (1990, 1994), who argue that real wages are a negative function of the unemployment rate (i.e. are a positive function of the employment rate). The current model is a growth model so that wage bill division is cast in terms of a wage share curve, reflecting the fact that the absolute level of wages rises with productivity growth.

An important feature of the model is that equations (11) and (20) clearly distinguish between firms' goods market monopoly power and workers' bargaining power. Equation (11) determines the wage share of income in accordance with Kaleckian markup pricing theory of income distribution. Goods market monopoly power is therefore the determinant of the functional distribution of income. Equation (20) determines the division of the wage bill between workers and middle managers, with workers' share being a positive function of the employment rate, hours and their labour market bargaining power.

The fourth segment of the model goods market is described as follows:

$$Y = D \tag{21}$$

$$I/K = S/K \tag{22}$$

$$I/K = g_K = i(\pi, h) \qquad i_\pi > 0, i_h > 0 \tag{23}$$

$$S/K = S_M/K + S_T/K \tag{24}$$

$$S_M/K = s_M = (1-\beta_M)\left[(1-\theta)\sigma_\omega + z_M(1-\mu)\sigma_\pi\right] Y/K \tag{25}$$

$$S_T/K = s_T = (1-\beta_T)\left[\mu\sigma_\pi + z_T(1-\mu)\sigma_\pi\right] Y/K \qquad 0 < \beta_T < \beta_M < 1 \tag{26}$$

$$= T(h, \sigma_\pi, \mu, \beta_T, z_T, \kappa) \qquad T_h > 0, T_{\sigma\pi} > 0, T_{\beta T} < 0, T_\mu > 0, T_{zT} > 0, T_\kappa > 0$$
$$z_M + z_T = 1 \tag{27}$$

where β_M is middle managers' propensity to consume and β_T is top managers' propensity to consume.

[8] Again, the positive effect of h on θ is included for maximum generality. If tighter labour market conditions (e) increase workers' share of the wage bill, increased hours of utilisation (h) might be expected to have similar directional effects.

Equation (21) is firms' production rule whereby firms produce to demand with variations in demand being accommodated by variations in hours of utilisation. Equation (22) is the goods market clearing condition, which holds at all times and has the rate of accumulation equal to the saving rate. Equation (23) determines the rate of accumulation, which is a positive function of the profit rate and hours of utilisation. Equation (24) is the definition of aggregate saving, which is made up of saving by middle and top managers. Workers are assumed to consume all of their wage income and have a zero propensity to save. Two important implications follow from this assumption. First, redistributions of income from either middle or top managers to workers increases consumption since workers have a zero propensity to save. Second, ownership of the capital stock is held entirely by middle and top managers.

Equation (25) determines middle managers' saving rate, which is a positive function of their wage income and their ownership share of profits after payments to top management. Equation (26) determines top managers' saving rate, which is a positive function of their remuneration out of profits and their ownership share of profits attributable to firms. The propensity to save of top managers is assumed to exceed that of middle managers. That means redistributions of income from top to middle managers increases consumption spending. Lastly, equation (27) is the ownership share adding up constraint that has the ownership shares of middle and top managers sum to unity.

The fifth segment of the model is the labour market, which is described by the following two equations:

$$e = N/L \tag{28}$$

$$g_e = g_N - g_L \tag{29}$$

where L is the labour force, g_e is the rate of change of the employment rate and g_L is the labour force growth rate. Equation (28) defines the employment rate, while equation (29) determines the rate of change of the employment rate. The employment rate is a state variable and its evolution is driven by the growth of employment and labour supply. In steady state the employment rate must be constant so that $g_N = g_L$. Absent satisfaction of this condition, over time there would be exploding excess demand for or excess supply of labour.

The sixth and final segment of the model concerns the distribution of ownership, which connects to Pasinetti's (1962) famous article. The Pasinetti condition is often misinterpreted as an IS goods market equilibrium condition, but it is in fact an ownership equilibrium condition (Dutt, 1990; Palley, 2012C). The distribution of ownership is critically important for AD as it determines the distribution of profits across households. Ownership shares are a slow-evolving state variable. In the current model, ownership is restricted to middle managers and top managers as workers have no saving. As shown in Palley (2012C), in a two-class model, ownership shares will be in equilibrium when the share of either class is constant. In an n-class ownership economy, ownership shares will be in equilibrium when $n - 1$ class shares are constant.

The evolution of top managers' ownership share is given by:

$$g_{zT} = Z\left(s_T - z_T g_k\right) \qquad Z' > 0,\ Z(0) = 0 \tag{30}$$

Equation (30) states that top managers' ownership share is increasing when their saving exceeds the share of investment that top managers must finance to maintain their ownership share. Since there are two classes, ownership shares are in equilibrium when the top managers' share is constant, which implies the following steady-state ownership condition:

$$s_T = z_T g_k \tag{31}$$

4. Short-run equilibrium

The model has a short-run equilibrium and a long-run steady-state equilibrium. The short-run equilibrium determines the instantaneous level of output (Y), hours of utilisation (h), the profit share (σ_π), the profit rate (π), the rate of capital accumulation and growth (g_K) and the saving rate (S/K).

Appropriate substitution enables the short-run model to be reduced to two equations given by:

$$\sigma_\pi = \pi\left[m(\psi)\right] \tag{32}$$

$$i\left\{(1-\mu)v\left[m(\psi)\right]h\kappa,\, h\right\} = s\left\{h,\, v\left[m(\psi)\right],\, \mu,\, \theta(e,h,x),\, z_T,\, \beta_T,\, \beta_M,\, \kappa\right\} \tag{33}$$

$$i(h,\, \psi,\, \mu,\, \kappa) = s(h,\, e,\, z_T,\, \psi,\, \mu,\, x,\, \beta_T,\, \beta_M,\, \kappa)$$

$$i_h = i_\pi \pi_h + i_h > 0, i_\psi = i_\pi \pi_\psi > 0$$

$$s_h = s_h + s_\theta \theta_h > 0, s_\psi = s_v v_m m_\psi > 0,\ s_e = s_\theta \theta_e <\ 0,\ s_x = s_\theta \theta_x < 0,\ s_{zT} > 0,\ s_{\beta T} < 0,\ s_{\beta M} < 0$$

The two endogenous variables are σ_π and h. Figure 3 provides a graphical determination of short-run equilibrium outcomes. The PP schedule in the north-east quadrant corresponds to equation (32) and determines the profit share. In the current model, the PP schedule is horizontal and independent of hours.[9] The IS schedule represents equation (33) and its slope depends on the type of regime. The IS schedule represents combinations of hours and the profit share consistent with investment–saving balance.

As is well known, according to neo-Kaleckian theory, economies can be wage led, profit led or conflictive (Bhaduri and Marglin, 1990). In a wage-led economy an exogenous increase in the profit share lowers hours (utilisation) and growth. Growth falls because the utilisation effect dominates any profit share benefit. Conflictive economies are a subset of wage-led economies, but now an exogenous increase in the profit share lowers utilisation but increases growth. Growth increases because the profit share effect dominates the utilisation effect. In a profit-led economy an exogenous increase in the profit share raises both utilisation and growth because the utilisation and profit share effects work in the same direction. The conditions determining the character of the economy are shown in Table 3.

[9] Other specifications of the markup are possible. The markup can be a positive function of utilisation (h) reflecting simple factors of demand pressure. Alternatively, it can be a negative function of utilisation for reasons of either profit squeeze by insider workers or for strategic price-setting reasons (Rotemberg and Saloner, 1986).

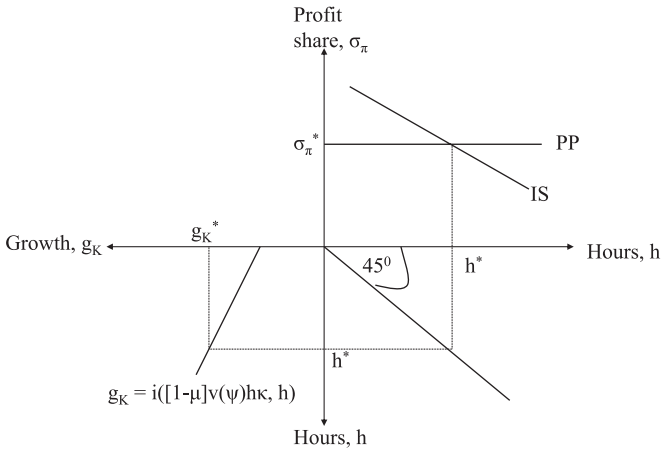


Fig. 3. *Determination of short-run equilibrium in the wage-led case.*

Table 3. *Conditions describing profit-led, wage-led and conflictive regimes*

	Capacity utilisation	Investment rate
Profit-led	$h_\psi > 0$	$i_\pi \pi_\psi + i_h h_\psi > 0$
Wage-led	$h_\psi < 0$	$i_\pi \pi_\psi + i_h h_\psi < 0$
Conflictive	$h_\psi < 0$	$i_\pi \pi_\psi + i_h h_\psi > 0$

The slope of the IS is given by:

$$d\sigma_\pi / dh = \left(s_h - i_h\right) / \left(i_{\sigma\pi} - s_{\sigma\pi}\right)$$

The numerator is positive, reflecting the Keynesian expenditure multiplier condition, but the sign of the denominator is ambiguous. In a wage-led economy the denominator is negative, rendering the IS slope negative. This is because an increase in the profit share lowers AD and has a larger absolute effect on saving than investment. The same holds for a conflictive economy. In a profit-led economy the denominator is positive, making the slope of the IS positive. That is because an increase in the profit share increases AD and increases investment relative to saving.

Figure 3 shows the IS as negatively sloped, reflecting the case of a wage-led economy.[10] Hours and the profit share are determined by the intersection of the IS and PP schedules in the north-east quadrant. That intersection corresponds to a combination of hours and profit share consistent with both goods market equilibrium and firms' markup pricing behaviour. The south-west quadrant shows the rate of capital accumulation as a function of hours and the rate of capital accumulation determines the growth rate.

Table 4 shows the comparative statics for the response of the short-run endogenous variables (σ_π, h, g_K) to changes in the exogenous variables (ψ, x, μ, β_T, β_M, e, z_T) in

[10] As an economy becomes less wage led, the IS steepens and rotates clockwise. A vertical IS corresponds to an economy that is neither wage led nor profit led. Given this transition pattern, the IS schedule for profit-led economies is assumed to be steeper than the PP schedule.

Table 4. *Signing of short run comparative statics*

		$d\psi$	dx	$d\mu$	$d\beta_T$	$d\beta_M$	de	dz_T
Wage led	$d\sigma$	+	0	0	0	0	0	0
	dh	−	+	−	+	+	+	−
	dg_K	−	+	−	+	+	+	−
Profit led	$d\sigma$	+	0	0	0	0	0	0
	dh	+	+	−	+	+	+	−
	dg_K	+	+	−	+	+	+	−
Conflictive	$d\sigma$	+	0	0	0	0	0	0
	dh	−	+	−	+	+	+	−
	dg_K	+	+	−	+	+	+	−

different regimes. These comparative statics can be derived by appropriately shifting the growth function and the IS and PP schedules in Figure 3. The effect of an increase in firms' monopoly power ($d\psi$) is shown in the first column of Table 4 and varies according to whether the economy is wage led, profit led or conflictive. The increase in the profit share shifts the PP function up and shifts the growth function left in the south-west quadrant. In wage-led regimes the net effect is to lower hours and growth. In profit-led regimes it raises hours and growth. In conflictive regimes it lowers hours but increases growth.

In all regimes, increases in the workers' bargaining power *vis-à-vis* middle managers (dx) raises hours and growth. It does so by increasing workers' share of the wage bill, which increases AD and shifts the IS right.

Increases in top managers' pay ($d\mu$) reduce hours and growth in all regimes. The logic is as follows. As a deduction from surplus, increased top managers' pay reduces the profit rate, which tends to reduce accumulation and growth. The increase in top managers' pay also reduces middle managers' income by reducing the latter's ownership income and aggregate saving increases because top managers have a lower propensity to consume than do middle managers. These negative effects on AD shift the IS left. At the same time, the lower profit rate shifts the growth function right.

An increased propensity to consume of middle ($d\beta_M$) and top managers ($d\beta_T$) raises hours and growth in all regimes. This is because they increase AD, shifting the IS right. Increases in the employment rate raise hours and growth in all regimes. A higher employment rate (de) raises workers' share of the wage bill, increasing AD and shifting the IS right. Finally, increases in the top managers' ownership share (dz_T) lower hours and growth in all regimes. This is because profit income shifts from middle managers to top managers, reducing AD and shifting the IS left.

The reduced form solutions for the endogenous variables in the profit-led regime are:

$$h = h\left(e, z_T, \psi, \mu, x, \beta_T, \beta_M, \kappa\right) h_e > 0,\ h_{zT} < 0,\ h_\psi > 0,\ h_\mu < 0,\ h_x > 0,\ h_{\beta T} > 0,\ h_{\beta M} > 0 \quad (34A)$$

$$g_K = i\left(e, z_T, \psi, \mu, x, \beta_T, \beta_M, \kappa\right) i_e > 0,\ i_{zT} < 0,\ i_\psi > 0,\ i_\mu < 0,\ i_x > 0,\ i_{\beta T} > 0,\ i_{\beta M} > 0 \quad (34B)$$

The solutions for the wage-led regime are:

$$h = h(e, z_T, \psi, \mu, x, \beta_T, \beta_M, \kappa) h_e > 0, h_{zT} < 0, h_\psi < 0, h_\mu < 0, h_x > 0, h_{\beta T} > 0, h_{\beta M} > 0 \quad (35A)$$

$$g_K = i(e, z_T, \psi, \mu, x, \beta_T, \beta_M, \kappa) i_e > 0, i_{zT} < 0, i_\psi < 0, i_\mu < 0, i_x > 0, i_{\beta T} > 0, i_{\beta M} > 0 \quad (35B)$$

The solutions for the conflictive regime are:

$$h = h(e, z_T, \psi, \mu, x, \beta_T, \beta_M, \kappa) h_e > 0, h_{zT} < 0, h_\psi < 0, h_\mu < 0, h_x > 0, h_{\beta T} > 0, h_{\beta M} > 0 \quad (36A)$$

$$g_K = i(e, z_T, \psi, \mu, x, \beta_T, \beta_M, \kappa) i_e > 0, i_{zT} < 0, i_\psi > 0, i_\mu < 0, i_x > 0, i_{\beta T} > 0, i_{\beta M} > 0 \quad (36B)$$

Finally, as noted in Palley (2005), introducing a wage bill division channel means the economy can simultaneously display both profit-led and wage-led characteristics. Thus, the economy can be profit led with respect to monopoly power ($dh/d\psi > 0$ and $dg_K/d\psi > 0$), but increases in the workers' share of the wage bill due to increased workers' bargaining power stimulate economic activity and growth ($dh/dx > 0$ and $dg_K/dx > 0$).

5. Steady-state equilibrium and comparative statics

The short-run model determines the profit share, hours and the instantaneous rate of growth. Within the model there are two state variables: the employment rate (e) and top managers' ownership share (z_T). These two variables are driven, respectively, by equations (29) and (30).

Substituting the solutions for the short-run endogenous variables, this yields two equations of motion given by:

$$\begin{aligned} g_e &= g_K - a(g_K, h, e, \chi) - g_L \qquad a_{gK} > 0, a_h > 0, a_e > 0, a_\chi > 0 \\ &= i(e, z_T, \psi, \mu, x, \beta_T, \beta_M, \kappa) \\ &\quad - a\left[i(e, z_T, \psi, \mu, x, \beta_T, \beta_M, \kappa), h(e, z_T, \psi, \mu, x, \beta_T, \beta_M, \kappa) e, \chi \right] - g_L \\ &\qquad + - \qquad ++ - \qquad + + - \qquad + + \\ &= i(e, z_T, \ldots) - a[i(e, z_T, \ldots), h(e, z_T, \ldots) e, \chi] - g_L \\ &= G(e, z_T, \ldots) \end{aligned} \quad (37)$$

$$\begin{aligned} g_{zT} &= Z(s_T - z_T g_k) \\ &\qquad + + + \qquad\qquad\qquad + - \\ &= Z\left[s(e, z_T, \psi, \mu, x, \beta_T, \beta_M, \kappa) - z_T i(e, z_T, \psi, \mu, x, \beta_T, \beta_M, \kappa) \right] \\ &= Z(e, z_T,). . \end{aligned} \quad (38)$$

Equations (37) and (38) constitute a system of simultaneous differential equations in e and z_T. Linearising around the steady-state equilibrium of $e^\star$ and $z_T^\star$ yields:

$$g_e = \begin{matrix} ?/+ & ?/- \\ \left| G_e \right. & \left. G_{zT} \right| \end{matrix} \begin{matrix} \\ \left| e - e^{\star} \right| \end{matrix} \tag{39A}$$

$$\begin{matrix} + & - \\ g_{zT} = \left| Z_e \right. & \left. Z_{zT} \right| \end{matrix} \begin{matrix} \\ \left| z_T - z_T^{\star} \right| \end{matrix}$$

$$\begin{matrix} ?/+ & + & ++ & + \\ G_e = (1 - a_i) i_e & - a_h h_e & - a_e \gtrless 0, & \end{matrix} \quad \begin{matrix} ?/+ & - & + & - \\ G_{zT} = (1 - a_i) i_{zT} & - a_h h_{zT} \gtrless 0 & & \end{matrix} \tag{39B}$$

$$Z_e = Z' (s_e - z_T i_e) > 0, \quad Z_{zT} = Z' (s_{zT} - i - z_T i_{zT}) < 0$$

Z_e is positive, reflecting the Keynesian multiplier stability condition whereby an increase in income, due to increased employment, generates a larger increase in saving than investment. Z_{zT} is negative because an increase in the capitalists' ownership share increases their obligation to invest to maintain their ownership share by more than it increases their saving. This stops capitalists saving their way to total ownership of the capital stock.

G_e is ambiguous. It is positive if the induced innovation effects of investment (a_i), hours (a_h) and employment (a_e) are zero. G_e will tend to be positive if these effects are weak, but it may be negative if they are strong. G_{zT} is also ambiguous. It too will be positive if induced innovation effects are zero, but it may be negative if they are strong.[11]

Phase plane analysis can help with understanding the model. Setting equations (37) and (38) equal to zero, differentiating totally with respect to e and z_T and rearranging gives the slopes of the equilibrium isoclines:

$$dz_T/de\big|_{ee} = -G_e/G_{zT} = -\left[(1 - a_i) i_e - a_h h_e - a_e \right] / \left[i_{zT} (1 - a_i) - a_h h_{zT} \right] = ?$$

$$dz_T/de\big|_{zz} = -Z_e/Z_{zT} = -(s_e - z_T i_e) / (s_{zT} - i - z_T i_{zT}) = -/- > 0$$

The *zz* isocline tracks combinations of the employment rate (e) and capitalists' ownership shares (z_T) along which ownership shares are constant. It is positively sloped. As the employment rate increases, middle managers' share of the wage bill and total saving falls, increasing capitalists' ownership share.

The *ee* isocline tracks combinations of the employment rate and capitalists' ownership shares along which the employment rate is constant. Its slope is ambiguous. There are three cases to consider. First, if induced innovation effects are very strong (a_i, a_h and a_e are large) then $G_{zT} > 0$ and $-G_e > 0$ so that the *ee* isocline is positively sloped. This is the optimistic post-Keynesian endogenous growth case. Second, if induced innovation effects are small, then $G_{zT} < 0$ and $-G_e < 0$ so that the *ee* isocline is again positive. This is the pessimistic endogenous growth case. Third, there is the intermediate case where $G_{zT} < 0$ but $-G_e > 0$ because of the additional term, $a_e > 0$. In this case the *ee* isocline will be negatively sloped.[12] Lastly, it should be noted that if $a_h = 0$ and $a_i < 1$, the optimistic case disappears and the model reduces to just the intermediate (stable) case and the pessimistic (unstable) case.

The analysis below explores both the intermediate and optimistic cases. In the 'Golden Age' (1945–70) era after World War II, when productivity growth was rapid,

[11] Jones (1999) and Taylor (2004, pp. 188–9) show that the existence of steady-state stability in standard supply-driven growth models requires that the endogenous innovation effect from investment be less than unity so that $1 - a_i > 0$.

[12] The slope of the *ee* schedule rotates counterclockwise as the strength of induced innovation falls.

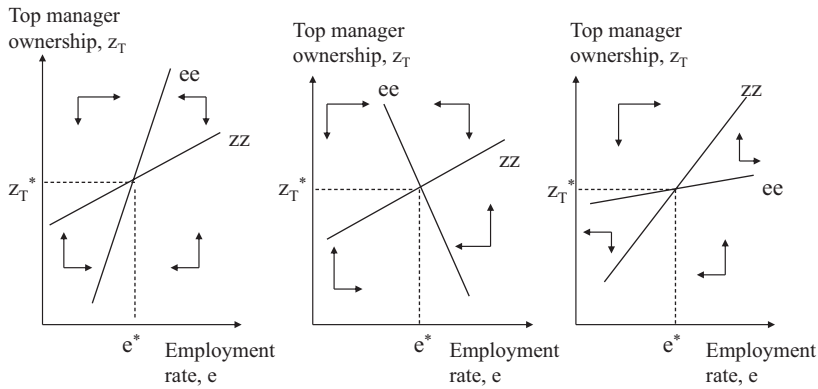
the optimistic case may have prevailed. Given the productivity slowdown that began in the 1970s, the economy likely transitioned to the intermediate case. The information technology-led revival of productivity growth may now have reversed that.

Figure 4 shows the isoclines for the three cases of intermediate, optimistic and pessimistic productivity growth. The model economy is unstable with very weak productivity growth (the pessimistic case), because as the employment rate increases the growth of employment increases. However, since there is minimal endogenous productivity growth to increase effective labour supply growth, the economy confronts a growing labour supply shortage as employment growth exceeds labour supply growth.

Table 5 presents the comparative static effects for the intermediate case. An increase in firms' monopoly power (ψ) increases top managers' saving, shifting the *zz* up. If the economy is wage led, the *ee* shifts left so that $e^\star$ falls while the change in $z_T{}^\star$ is formally ambiguous. If the shift of the *ee* dominates, top managers' ownership share falls. That is because middle managers receive a double benefit from the increased profit share and from an increased share of the wage bill due to lower *e*, which increases their share of total saving. If the economy is profit led, the *ee* shifts right. Now $z_T{}^\star$ increases unambiguously and the change in $e^\star$ is ambiguous.

An increase in workers' bargaining power (x) lowers middle managers' wage share and increases AD. This increases top managers' share of saving and shifts the *zz* up. It also raises AD and investment, which shifts the *ee* right. $z_T{}^\star$ therefore increases, but the direction of change of $e^\star$ is ambiguous.

An increase in top managers' pay (μ) shifts the *zz* up and the *ee* left so that $e^\star$ falls but the change in $z_T{}^\star$ is ambiguous. Once again, if the shift of the *ee* dominates,



(a) Optimistic case: stable (b) Intermediate case: stable (c) Pessimistic case: unstable

Fig. 4. *Determination of steady-state employment rate and capitalists' ownership share for the intermediate, optimistic and pessimistic cases of endogenous productivity growth.*

Table 5. *Comparative statics for the intermediate case*

	$d\psi$ wage led	$d\psi$ profit led	dx	$d\mu$	$d\beta_T$	$d\beta_M$	$d\chi_M$
$de^\star$	−	?/+	?/+	−	+	?/+	−
$dz_T{}^\star$	?/+	+	+	?/−	?/+	+	−

top managers' ownership share can fall. This apparent paradox is because the fall in the employment rate increases middle managers' share of the wage bill, which may increase their share of total saving.

An increase in top managers' propensity to consume (β_T) shifts the *zz* down and the *ee* right so that $e^\star$ rises but the change in $z_T{}^\star$ is ambiguous. If the shift of the *ee* dominates, top managers' ownership share increases. Again, the reason is that a higher employment rate lowers middle managers' share of the wage bill, decreasing their share of total saving and wealth.

An increase in middle managers' propensity to consume (β_M) shifts the *zz* up because it reduces relative saving of middle managers and shifts the *ee* right. $z_T{}^\star$ rises but the change in $e^\star$ is ambiguous. $e^\star$ increases if the shift of the *ee* dominates.

Lastly, an exogenous increase in productivity growth (χ) shifts the *ee* isocline left, causing a fall in both $e^\star$ and $z_T{}^\star$. The increase in effective labour supply growth decreases the employment rate. This causes an increase in middle managers' share of the wage bill, which increases their share of total saving and wealth, thereby reducing capitalists' ownership share.

The ambiguous outcomes in Table 5 are accompanied by signings that assume the shift of the *ee* dominates the shift of the *zz*. If the shift of the *ee* dominates, the change in the employment rate is the same as that predicted by the conventional neo-Kaleckian model. The reason for the ambiguity in the current model is wealth distribution effects. Increases in the employment rate increase workers' share of the wage bill. However, that generates an offsetting effect by reducing middle managers' share of the wage bill, which reduces their ownership share and increases top managers' share of profits. This opposing wealth redistribution effect is absent in the conventional neo-Kaleckian model, which assumes capitalists own everything, and it shows the importance of accounting for wealth distribution. Lastly, the macroeconomic effect of changes in ownership will depend on the size of the profit share. When the profit share is high (as it is now), the distribution of ownership becomes more significant as changes in ownership distribution have larger effects on AD.

Table 6 shows the comparative statics outcomes for the optimistic case. An increase in firms' monopoly power (ψ) increases the profit share and top managers' saving, shifting the *zz* locus up. If the economy is wage led, the *ee* locus shifts left. The effect on both $z_T{}^\star$ and $e^\star$ is ambiguous and depends on whether the shift of the *ee* or *zz* is dominant. The ambiguity with regard to $e^\star$ is due to the strong induced innovation effect in the optimistic case. The higher profit share lowers the employment rate because the economy is wage led, which reduces induced innovation and effective labour supply growth. This may ultimately generate a tighter labour market after wealth ownership has adjusted. If the economy is profit led, the *ee* locus shifts right instead of left and both $z_T{}^\star$ and $e^\star$ increase.

Table 6. *Comparative statics for the optimistic case*

	$d\psi$ wage led	$D\psi$ profit led	dx	$d\mu$	$d\beta_T$	$d\beta_M$	$d\chi_M$
$\boldsymbol{de^\star}$	?/−	+	+	?/−	?/+	+	−
$\boldsymbol{dz_T{}^\star}$	+/?	+	+	+/?	−/?	+	−

An increase in workers' bargaining power (x) lowers middle managers' wage share, which increases top managers' relative saving and shifts the zz up. It also raises AD and investment, which shifts the ee right. $z_T^\star$ and $e^\star$ both increase unambiguously.

An increase in top managers' pay (μ) shifts the zz up. It also shifts the ee left, because a lower profit rate lowers capital accumulation as well as redistributing profit income from middle managers to capitalists, who have a higher propensity to save. Once again, the effect on both capitalists' ownership share ($z_T^\star$) and the employment rate ($e^\star$) is ambiguous and the ambiguity is again due to the strong induced innovation effect. The lower profit rate lowers accumulation, which lowers the employment rate, reducing induced innovation and effective labour supply growth, which in turn may ultimately generate a tighter labour market after wealth ownership has adjusted.

An increase in top managers' propensity to consume (β_T) shifts the zz down and the ee right so that the effect on both $z_T^\star$ and $e^\star$ is ambiguous. An increase in middle managers' propensity to consume (β_M) shifts the ee right. The zz shifts up as the induced increase in income from less middle class saving raises capitalist saving by more than their share of investment. Thus $z_T^\star$ and $e^\star$ both increase.

Lastly, an exogenous increase in productivity growth (χ) shifts the ee isocline left, causing a fall in both $e^\star$ and $z_T^\star$. The logic of these outcomes is the same as in the intermediate case. Increased effective labour supply growth decreases the employment rate, increasing middle managers' share of the wage bill and total saving and thereby reducing capitalists' ownership share.

Table 6 shows that the comparative statics for the employment rate in the optimistic case. These effects are the same as the conventional neo-Kaleckian model if the shift of the ee locus dominates. In the optimistic endogenous productivity case, there are two sources of ambiguity compared with the standard neo-Kaleckian model. The first concerns wealth redistribution. Induced increases in the employment rate reduce middle managers' wage share, which reduces their share of saving and wealth, thereby redistributing profit income to top managers. The second concerns the strong endogenous productivity effect. Induced increases in the employment rate generate a strong productivity growth effect that increases effective labour supply growth, which impacts the employment rate. These wealth redistribution and productivity growth effects interact to generate ambiguous outcomes. Both are important and they complicate analysis of steady-state employment rate determination in the neo-Kaleckian model in ways that are counter to simple Keynesian intuitions.

Steady-state growth is determined by the rate of capital accumulation as follows:

$$g_Y = g_K = i(e, z_T, \psi, \mu, x, \beta_T, \beta_M, \kappa) \tag{40}$$

The comparative static signings for the intermediate case in Table 5 can then be used to identify the effect of changes in exogenous variables on steady-state growth. These effects are shown in Table 7, with the final column being the sum of the component effects. Increased firm monopoly power tends to lower growth in wage-led economies and raise it in profit-led economies. Increased workers' bargaining power regarding wage bill division tends to raise growth. Increased top managers' pay lowers growth. Increased top managers' propensity to consume raises growth, while increased middle managers' propensity to consume tends to also raise growth. An exogenous shock to productivity growth has an ambiguous effect on growth. On the one hand, it lowers the employment rate, which is bad for growth; on the other, it lowers capitalists' ownership

Table 7. *Comparative statics for steady state growth in the intermediate case*

$di/d\psi$ = (wage led)	$i_e e_\psi$ = +−	$i_{zT} z_{T\psi}$ = −+	i_ψ = −	Σ = −
$di/d\psi$ = (profit led)	$i_e e_\psi$ = ++	$i_{zT} z_{T\psi}$ = −+	i_ψ = +	Σ = +/?
di/dx =	$i_e e_x$ = ++	$i_{zT} z_{Tx}$ = −+	i_x = +	Σ = +/?
$di/d\mu$ =	$i_e e_\mu$ = +−	$i_{zT} z_{T\mu}$ = −+	i_μ = −	Σ = −
$di/d\beta_T$ =	$i_e e_{\beta T}$ =++	$i_{zT} z_{T\beta T}$ = --	$i_{\beta T}$ = +	Σ = +
$di/d\beta_M$ =	$i_e e_{\beta M}$ =++	$i_{zT} z_{T\beta M}$ = −+	$i_{\beta M}$ = +	Σ = +/?
$di/d\chi_M$ =	$i_e e_\chi$ =+−	$i_{zT} z_{T\chi}$ = --	i_χ = 0	Σ = ?

share and share of profit income, which is good for growth. A similar exercise can be done for the comparative static effects on steady-state growth in the optimistic case.

The main theoretical takeaway from Table 7 is that accounting for the endogeneity of wealth distribution complicates the analysis relative to the conventional neo-Kaleckian analysis in which it is assumed capitalists own all the wealth. Theoretically, it can lead to non-standard growth outcomes because the partial derivatives in the second column of Table 7 have opposing signs to those in the first and third columns. This possibility for non-standard effects is because changes in wealth distribution impact the division of profits across capitalist and middle-class households, which impacts AD and the rate of accumulation. Historically, these wealth distribution effects have been overlooked.

6. Personal income distribution and the endogeneity of wage- and profit-led regimes

As discussed in Section 4, a key feature of the neo-Kaleckian model is the distinction between wage- and profit-led growth. Introducing wage bill division changes the picture substantially. First, it provides a means of introducing the effects of personal income distribution into the analysis. Second, it makes the wage- or profit-led character of the economy endogenous.

Palley (2005) shows that redistributing the wage bill from managers to workers results in positive wage-led growth effects. Carvalho and Rezai (2013) show that reductions in the inequality of personal income distribution can shift the economy from a profit-led to a wage-led regime. This same effect is present in models with wage bill division, as the division of the wage bill determines the personal distribution of income. The effect arises because increases in the workers' share of the wage bill (θ) increase the equality of personal income distribution and they also increase the average propensity to consume out of wage income. Thus, the weighted average propensity to consume out of wages is given by:[13]

$$\beta = \theta/(1+\alpha) + \alpha(1-\theta)\beta_M/(1+\alpha) \tag{41}$$

where β is the weighted average propensity to consume out of wages and α is the middle manager/worker ratio. Differentiating with respect to θ yields $d\beta/d\theta = (1 - \alpha\beta_M)/(1 + \alpha) > 0$.

[13] The weights to the average propensity to consume are obtained as follows. Total employment (E) of workers and managers is given by $E = N + M$. The number of middle managers is given by $M = \alpha N$. Algebraic manipulation then yields $N/E = 1/(1 + \alpha)$ and $M/E = \alpha/(1 + \alpha)$.

An increase in the workers' share of the wage bill, which is analogous to increased equality of personal income distribution, can therefore transform the economy from a profit-led to a wage-led regime because it increases the response of consumption to an increase in the wage share.

A second feature of equation (41) is that the average propensity to consume out of wages depends on the production structure. An increase in the proportion of middle managers relative to workers lowers the average propensity to consume out of wages since $d\beta/d\alpha < 0$. If the wage share is unchanged, an increase in the relative size of the middle class relative to the working class can shift the economy from being wage led to profit led. The logic is that it shifts the fixed wage bill towards middle managers, who have a lower propensity consume. This shows how the supply side affects the demand side. It also shows how an expansion of the middle class can be contractionary.

A third feature of the model is that the economy can shift endogenously from being profit led to being wage led and vice versa. This is because the division of the wage bill is endogenous. Thus, substituting for θ in equation (41) yields:

$$\beta = \theta(e)/(1+\alpha) + \alpha[1-\theta(e)]\beta_M/(1+\alpha) \tag{42}$$

Differentiating with respect to e yields $d\beta/de = \theta_e(1 - \alpha\beta_M)/(1 + \alpha) > 0$. Increases in the employment rate (e) increase workers' share of the wage bill, which increases the weighted average propensity to consume out of wages and may shift the shift the economy from a profit-led to a wage-led regime.[14] This endogenous regime shift effect is in addition to endogenous regime shift effects that may arise because of non-linearity in investment and saving behaviour (Palley, 2013B).

7. Theoretical extensions

Before concluding with an analysis of the political economy of the model, it is worth noting some extensions of the model that can be easily incorporated. As noted at the beginning, this paper is a refinement of the two-class model with managerial pay presented in Palley (2013A). The model in that paper also included additional channels allowing the employment rate to affect AD via its impact on inflation and via household sentiments about economic security. Those same channels can be incorporated in the current model as shown in Figure 5, which is an augmented version of Figure 2.

8. Political economy and conclusions

The above model provides a rich, coherent and plausible description of capitalist economies with three classes. The model yields important economic insights. It also yields fresh political economy insights, which are the subject of this concluding section.

The top manager class benefits from an increase in both the profit share (σ_π) and the share of profits paid top manager pay (μ). From a macroeconomic perspective, top managers are parasitic as their pay reduces business profitability, thereby reducing capital accumulation and growth. However, from a microeconomic control perspective,

[14] A similar endogenous regime shift effect can be generated in the simpler standard neo-Kaleckian model by making the distribution of the wage bill a function of the rate of capacity utilisation.

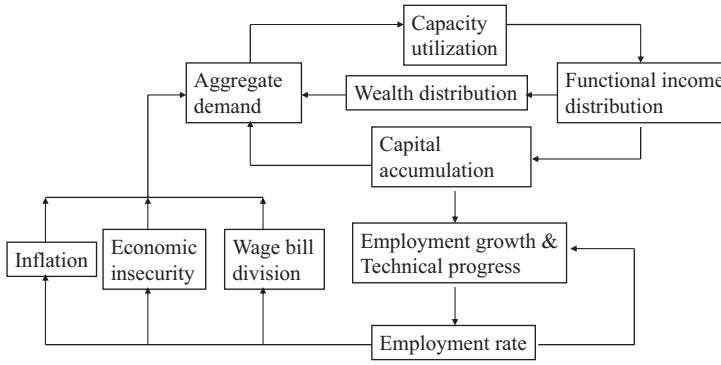


Fig. 5. *Extending the model to incorporate inflation and economic insecurity channels.*

top managers may act as a magnet for the aspirations of middle managers (i.e. the middle class) who would like to join them. Those aspirations can serve to get the middle class to politically align itself with the top manager class.

The middle class occupies a position that is politically the most interesting and it can be drawn into political alliances with either the top manager class or workers. The middle class benefits from a higher profit share via its ownership of capital, which places it in alliance with top managers. However, the middle class bears part of the cost of top managers' pay, which reduces the profit income it receives and this places it in opposition to the top manager class.

The middle class has a common interest with workers in that it benefits from an increased wage share (σ_ω), which increases the amount for wage bill division. However, it is in conflict with workers over the division of the wage bill (θ). A critical issue is whether the middle class sees the wage bill share or profit share as more important for its prosperity. If it sees the wage bill share as more important, it will be more likely to ally politically with workers; if it sees the profit share as more important, it will be more likely to ally politically with capitalist top managers.

Workers are opposed to top managers because they suffer from both an increase in the profit share and an increase in the share of profits paid to managers. The former directly harms workers by reducing the wage share, while the latter indirectly harms workers by reducing employment and growth. The one exception is if the economy is profit led in which case a higher profit share may indirectly benefit workers by generating a higher employment rate and faster growth. However, that same outcome can be achieved by reducing the share of profits paid to top managers, a policy that benefits workers at no cost to them in the form of a reduced wage share.

Workers are aligned with the middle manager class in the desire for a higher wage share, but are in conflict with the middle class over the division of the wage bill.

Today's political discourse presents the middle class as heroic. However, viewed through a three-class economic model, this is not necessarily the case. There are several reasons to believe the middle manager class will tend to ally with the top manager class. First, there is the issue of aspirations, with middle managers aspiring to join the top manager class. Second, there are two power variables in the model: monopoly power that increases the profit share and workers' bargaining power that increases workers' share of the wage bill. In the real world, it seems likely that institutions and policies that increase firms' monopoly power also decrease workers' bargaining power. This gives reason for the middle class reason to ally politically with the top manager class. That

would seem to be the lesson of the 30-year attack on unions and corporate globalisation. The middle class will only defect from this political alliance with the top manager class when the squeeze on the wage bill becomes so severe that it outweighs middle class gains from an increased share of the wage bill and increased profit income.

The working class may also choose to ally politically with the top manager class. However, in the current model that can only happen because of aspirational false consciousness whereby individual workers see themselves as becoming part of the top manager class. Such workers' false consciousness is either a form of the 'Lake Wobegon' effect, whereby everybody views themselves as above average and therefore likely to make the class leap, or a form of lottery purchase behaviour, where making the class leap is like winning the lottery.

That suggests two extensions of the model. One extension is to introduce a second class of workers analogous to a distinction between skilled and unskilled labour.[15] At the macroeconomic level there is little change because skilled and unskilled workers have no saving, so there are no AD effects from wage redistributions between skilled and unskilled workers. However, at the microeconomic and political levels there can be significant effects. Suppose skilled wages are an institutionally determined multiple of unskilled wages given by:

$$w_S = \varphi(p) w_U \qquad \varphi > 1,\ \varphi_p > 0 \tag{43}$$

where w_S is the skilled wage, w_U is the unskilled wage and p is the policy variable. If the skilled wage multiple is a positive function of the same institutional arrangements and policies as those increasing the profit share and middle managers' wage share, skilled workers may defect from an alliance with unskilled workers and seek an alliance with middle and top managers.

A second extension is to give workers a small claim on capital. Giving workers an ownership share enormously complicates the model by introducing a third class of owners. Rather than going that route, suppose workers are given a small share of profits after top managers' pay as follows:

$$v = \varphi(1-\mu)\sigma_\pi \qquad 0 < \varphi < 1 \tag{44}$$

where v is the payment to workers out of profits. In this case, workers may identify with politics and policies that increase the profit share at the expense of the wage share. This type of policy corresponds to 401(k) capitalism pushed by Democrats and Republicans in the USA over the past 30 years, which has directed workers' pension funds away from traditional defined benefit plans into individual retirement accounts. Such accounts do not make capitalists of workers but they may contribute to creating a false economic consciousness that has workers support policies and politics that are against their real economic interest.[16]

[15] Divisions related to race and gender can play the same role as a skilled versus unskilled division.

[16] Lima (2012) explores the implications of profit sharing in the neo-Kaleckian growth model. He reports that increases in the profit-sharing coefficient increase capacity utilisation by increasing workers' remuneration and aggregate effective demand. The result will reverse if the increase in the workers' profit share comes at the expense of the wage payment, lowering total workers' remuneration.

In summary, a three-class neo-Kaleckian growth model provides a rich framework for analysing the economics and political economy of contemporary capitalism. Focusing on purely economic characteristics, the model represents the middle class as much smaller than standard political conversation. This is because the middle class is identified with middle management and as having an ownership share of the capital stock. Given this narrower definition, the middle class can be a political force for increased income inequality and slower growth.

Current liberal discourse praising the middle class and claiming 'we are all middle class' obscures the reality of the political economy of the middle class. There are good reasons to believe the middle class is not a force for more egalitarian outcomes and faster growth. The 'we are all middle class' claim promotes false consciousness among the working class and enables the capitalist class to misrepresent itself as middle class. These features have a political function and consequence. The false identity of workers likely encourages them to support policies counter to their interest, while the misrepresentation of the upper class helps sustain workers' false consciousness and defuse class conflict. Developing a new political dialogue that reflects better the reality of class economic interests is a critical political challenge. Distinguishing between upper, middle and working class within economic analysis is a critical necessary step. The current model provides a frame for doing so.

Bibliography

Bhaduri, A. and Marglin, S. A. 1990. Unemployment and the real wage: the economic basis for contesting political ideologies, *Cambridge Journal of Economics*, vol. 14, 375–93

Blanchflower, D. G. and Oswald, A. J. 1990. The wage curve, *Scandinavian Journal of Economics*, vol. 92, 215–35

Blanchflower, D. G. and Oswald, A. J. 1994. *The Wage Curve*, Cambridge, MA, MIT Press

Bureau of Labor Statistics. 2012. Employment Report, available at http://www.bls.gov/news.release/archives/empsit_10052012.pdf

Carvalho, L. and Rezai, A. 2013. Personal Income Inequality and Aggregate Demand, paper presented at the annual conference of the Research Network in Macroeconomics and Macroeconomic Policies, Berlin, 24–25 October

Congressional Budget Office Study. 2011. *Trends in the distribution of household income between 1979 and 2007*, Washington DC, Congressional Budget Office.

Dutt, A. K. 1984. Stagnation, income distribution and monopoly power, *Cambridge Journal of Economics*, vol. 8, 25–40

Dutt, A. K. 1990. Growth, distribution and capital ownership: Kalecki and Pasinetti revisited, pp. 130–45 in Dutta, B., Gangopadhayay, S., Mookherjee, D. and Ray, D. (eds), *Economic Theory and Policy: Essays in Honor of Dipak Banerjee*, Bombay, Oxford University Press

Dutt, A. K. 2006. Aggregate demand, aggregate supply and economic growth, *International Review of Applied Economics*, vol. 20, 319–36

Goodwin, R. M. 1967. A growth cycle, pp. 54–8 in Feinstein, C. H. (ed.), *Capitalism and Economic Growth*, Cambridge, UK, Cambridge University Press

Hein, E. and Tarassow, A. 2010. Distribution, aggregate demand and productivity growth: theory and empirical results for six OECD countries based on a post-Kaleckian model, *Cambridge Journal of Economics*, vol. 34, no. 4, 727–54

Jones, C. I. 1999. Growth: with or without scale effects? *American Economic Review*, vol. 89, no. 2, 139–44

Kaldor, N. 1957. A model of economic growth, *Economic Journal*, vol. 67, 591–624

Kalecki, M. 1970. The class struggle and the distribution of national income, *Kyklos*, vol. 24, no. 1, 1–8

Lavoie, M. 1995. The Kaleckian model of growth and distribution and its neo-Ricardian and neo-Marxist critiques, *Cambridge Journal of Economics*, vol. 19, 789–818

Lavoie. M. 2009. Cadrisme within a post Keynesian model of growth and distribution, *Review of Political Economy*, vol. 21, no. 3, 369–91

Lima, G. T. 2012. A neo-Kaleckian model of profit sharing, capacity utilization, and economic growth, *Metroeconomica*, vol. 63, no. 1, 92–108

Mishel, L., Bivens, J., Gould, E. and Shierholz, H. 2012. *State of Working America*, Washington DC, Economic Policy Institute.

Mohun, S. 2006. Distributive shares in the US economy, 1964–2001, *Cambridge Journal of Economics*, vol. 30, no. 3, 347–70

Naastepad, C. W. M. 2006. Technology, demand and distribution: a cumulative growth model with an application to the Dutch productivity growth slowdown, *Cambridge Journal of Economics*, vol. 30, 403–43

Naastepad, C. W. M. and Storm, S. 2006/07. OECD demand regimes (1996–2000), *Journal of Post Keynesian Economics*, vol. 29, 211–46

Palley, T. I. 1996. Growth theory in a Keynesian mode: some Keynesian foundations for new growth theory, *Journal of Post Keynesian Economics*, vol. 19, 113–35

Palley, T. I. 1997. Aggregate demand and endogenous growth: a generalized Keynes–Kaldor model of economic growth, *Metroeconomica*, vol. 48, 161–76

Palley, T. I. 2005. Class conflict and the Cambridge theory of distribution, pp. 203–224 in Gibson, B. (ed.), *The Economics of Joan Robinson: A Centennial Celebration*, Cheltenham, Edward Elgar

Palley, T. I. 2012A. *From Financial Crisis to Stagnation: The Destruction of Shared Prosperity and the Role of Economics*, New York, Cambridge University Press

Palley, T. I. 2012B. Growth, unemployment and endogenous technical progress: a Hicksian resolution of Harrod's knife-edge, *Metroeconomica*, vol. 63, no. 3, 512–41

Palley, T. I. 2012C. Wealth and wealth distribution in the neo-Kaleckian growth model, *Journal of Post Keynesian Economics*, vol. 34, 449–70

Palley, T. I. 2013A. A neo-Kaleckian–Goodwin model of capitalist economic growth: monopoly power, labour market conflict and endogenous technical progress, *Cambridge Journal of Economics*, doi:10.1093/cje/bet001

Palley, T. I. 2013B. 'Enriching the Neo-Kaleckian Growth Model: Nonlinearities, Political Economy, and q Theory', Working Paper no. 335, Political Economy Research Institute

Pasinetti, L. 1962. Rate of profit and income distribution in relation to the rate of economic growth, *Review of Economic Studies*, vol. 29, 267–79

Rada, C. 2007. Stagnation or transformation of a dual economy through endogenous productivity growth, *Cambridge Journal of Economics*, vol. 31, 711–40

Rotemberg, J. J. and Saloner, G. 1986. A super-game theoretic theory of price wars during booms, *American Economic Review*, vol. 76, 390–407

Rowthorn, R. 1982. Demand, real wages and growth, *Studi Economici*, vol. 19, 3–54

Taylor, L. 1983. *Structuralist Macroeconomics*, New York, Basic Books

Taylor, L. 2004. *Reconstructing Macroeconomics: Structuralist Proposals and Critiques of the Mainstream*, Cambridge, MA, Harvard University Press

Uzawa, H. 1961. Neutral inventions and the stability of growth equilibrium, *Review of Economic Studies*, vol. 28, no. 2, 117–24

Van Treek, T. and Sturn, S. 2012. 'Income Inequality as a Cause of the Great Recession? A Survey of Current Debates', Conditions of Work and Employment Series no. 39, International Labor Office

Verdoorn, P. J. 1949. Fattori che regolano la sviluppo della produttivita del lavoro [Factors governing the growth of labor productivity], *L'Industria*, vol. 1, 3–10; transl. A. P. Thirlwall and G. Thirlwall (1979), repr. in Ironmonger, D., Perkins, J. O. N. and Tran, V. H. (eds), *National Income and Economic Progress*, Melbourne, Macmillan, 1988