

## **DRAFT – COMMENTS WELCOME**

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

#### **Abstract**

This paper presents a three class neo-Kaleckian model of growth and distribution with Goodwin – Marx labor market conflict. The three classes consist of workers, middle management that is identified as the middle class, and “top” management which is identified with the capitalist 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 characterized by more complicated political conditions in which the middle class has shared interest and conflicts with both top management capitalists and workers and is pulled regarding which side to take.

*Keywords:* Middle class, Neo-Kaleckian, Goodwin, economic growth, income distribution, managerial pay, bargaining power.

*JEL classification:* E12, O41, O33.

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#### **1 Introduction**

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 instance, on August 1, 2012, the well-connected liberal Democrat 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. Instead, class has been excluded via adoption of the concept of the representative consumer, and it may also have been excluded because of economists' belief that class is a sociological concept unbecoming of economics.

This paper aims to begin the process of filling that gap 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 which is identified with the capitalist class. The paper builds upon an earlier paper by Palley (2012b) that is 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 characterized by more complicated political conditions in which the middle class is pulled between siding with workers and siding with top management capitalists, 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 so 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 one percent; the middle manager class is identified with the next nineteen percent; and the worker class is identified with the bottom eighty percent. 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 U.S. private sector employment in

September 2012. Just over eighty percent of workers were classified as production and non-supervisory. Table 2 provides a decomposition of income and wealth shares, and both are heavily concentrated in the top twenty percent, and especially the top one percent. Income and wealth fall off rapidly beyond the top twentieth percentile.

Table 1. Composition of U.S. private sector employment, September 2012.

<b>Total private sector employment</b>	111.5 million	100%
<b>Production &amp; non-supervisory workers</b>	92.1	82.6
<b>Managerial employees</b>	19.4	17.4

Source: Bureau of Labor Statistics, Employment Report, September 2012, Tables B-1 and B-6.

Table 2. Distribution of income and wealth in the U.S.

	<b>Bottom 80%</b>	<b>Top 20%</b>	<b>Top 1%</b>
<b>Income share in 2007<sup>1</sup></b>	40%	60%	21%
<b>Wealth share in 2010<sup>2</sup></b>	19.5%	80.5%	30.4%

Sources: 1 = Trends in the Distribution of Household Income Between 1979 and 2007, Congressional Budget Office Study, Washington DC, October 2011. 2 = Table 6.6, State of Working America, Economic Policy Institute, Washington DC, September 2012.

## 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 (1981), 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 utilization. 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.<sup>1</sup>

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

The fourth strand of literature concerns the role of wealth distribution (Dutt, 1990; Palley, 2012d). Wealth ownership is a critical factor for 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 capitalists class, thereby finessing the wealth distribution issue. 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 (2012b) presents a two class model with workers and a

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<sup>1</sup> An early contribution was Palley (1996, 1997) who models technical progress as depending on capacity utilization, the rate of accumulation, and the capital stock. More recent applications include Naastepad (2006), Naastepad and Storm (2007) and Hein and Tarassow (2010) who have technical progress depend on capacity utilization 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.

<sup>2</sup> Dutt (2006) has a model in which the employment rate is indeterminate, whereas the employment rate is determined in Palley (2012c). This difference reflects different specifications of the impact of labor market conditions on induced technical progress.

manager-capitalist class in which managerial pay is part of the wage bill, and the division of the wage bill between workers and manager-capitalists depends on employment conditions. The current paper expands that earlier model to have three classes. It uses Kalecki's mechanism to determine top manager pay, and wage bill division conflict to determine middle manager pay.<sup>3</sup> The outcome of the wage bill division conflict is impacted by the state of the labor market, which is what warrants the link to Goodwin (1967).<sup>4</sup>

The structure of the proposed model is illustrated in Figure 1. The top half of the figure represents the conventional neo-Kaleckian growth model which embodies a causal loop between aggregate demand (AD), capacity utilization, income distribution, and capital accumulation. Now, there is the addition of a distribution of wealth channel running from the functional distribution of income to aggregate demand. 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 feedback to impact the character of innovation and the pace of labor productivity growth. This is the labor market balancing mechanism identified by Dutt (2006) and Palley (2012c). Finally, the employment rate impacts wage bill division between middle managers and workers (Palley, 2012b), thereby impacting AD. This

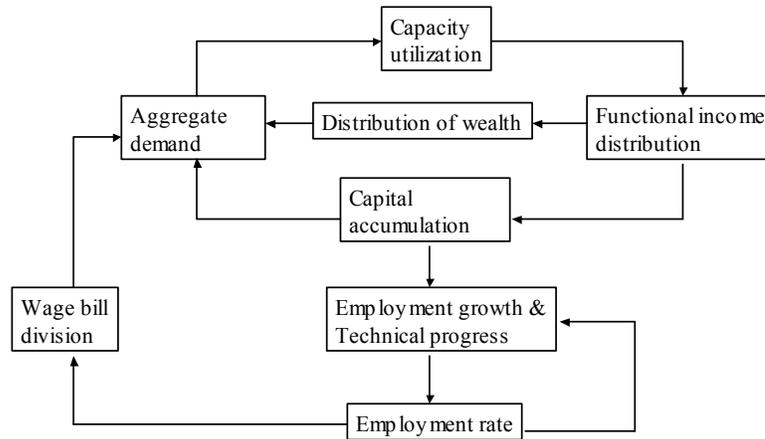
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<sup>3</sup> Managerial pay has long been an issue of interest for Post-Keynesians but it has been treated as exogenously determined. Palley (2005) emphasizes the significance of the division of managerial pay for AD. Lavoie (2009) also examines the issue of managerial pay, but his focus is the cyclical behavior of the mark-up given target return pricing and fixed managerial costs. The current paper endogenizes the division of the wage bill and focuses on the AD implications of wage bill division.

<sup>4</sup> Goodwin's (1967) model is a cyclical model, whereas the current model is not. Additionally, Goodwin emphasizes profit share conflict and full employment profit-squeeze drives cyclical growth. 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 in the current paper.

impact on AD provides a point of entry for labor market conflict and bargaining power into the neo-Kaleckian model, thereby adding traditional Goodwin (1967) – Marx class conflict over income distribution centered on the labor market. However, though the division of the wage bill involves traditional labor market conflict, the functional distribution of income remains determined by firms’ monopoly power in accordance with standard neo-Kaleckian theory.

Figure 1. Structure of the proposed neo-Kaleckian – Goodwin growth and distribution model.



### 3. The model

The model economy consists of six segments describing 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 labor market and the determination of the employment rate; and the determination of the distribution of wealth.

The production side of the economy is described as follows:

$$(1) Y = h \text{Min}[\kappa K, \lambda N, \lambda M/\alpha, \lambda T/\alpha\gamma] \quad 0 < h < h^{\text{Max}}$$

$$(2) M = \alpha N \quad \alpha > 0$$

$$(3) T = \gamma M \quad \gamma > 0$$

$$(4) g_Y = g_K$$

$$(5) g_K = g_N + g_a$$

$$(6) g_a = a(g_K, h, e, z) \quad a_{g_K} > 0, a_h > 0, a_e > 0, a_z > 0$$

$$(7) g_N = g_M = g_T$$

$Y$  = output,  $h$  = hours worked by workers,  $K$  = capital stock,  $N$  = employed workers,  $M$  = middle managers,  $T$  = top managers,  $A$  = state of technology,  $\kappa$  = productivity of capital (output-capital ratio),  $\lambda$  = worker productivity (output-worker ratio),  $\alpha$  = worker-manager ratio,  $g_Y$  = output growth,  $g_K$  = rate of capital accumulation,  $g_N$  = worker employment growth,  $g_a$  = rate of labor saving technical progress,  $e$  = employment rate,  $z$  = exogenous shift factor affecting technical progress, and  $g_M$  = managerial employment growth.

Equation (1) is the production function in which output depends on hours of utilization 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 production is done by workers who supply hours. Managers are a fixed but necessary overhead. 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 labor 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, the employment

rate, and an exogenous shift factor. Lastly, equation (7) determines the relationship between growth of worker, middle manager, and top manager employment.

The production structure is the same as Palley (2012c) subject to the addition of two types of managerial employment. Aside from the introduction of a distinction between production and supervisory labor (i.e. workers and managers), an important feature of the production structure is that capacity utilization is modeled 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 utilization 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 utilization is implicitly identified with having idle capital on hand for use by additional workers.

The analytic significance of introducing hours as the metric of capacity utilization is that it cuts the link between capacity utilization 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 utilization for different unemployment rates, reflecting the fact that capacity utilization concerns excess supply within firms whereas the unemployment rate concerns excess supply within the labor market. This separation contrasts with the conventional model in which output can only increase if employment increases with output.

The operation of the economy is as follows. Firms produce to meet demand, which is accomplished by variation of hours worked. From a modeling perspective,

output and hours are jump variables determined by short run forces. Employment, the capital stock, and the state of technology are state variables that evolve slowly.

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

$$(8) p = [1 + m]W/A\lambda$$

$$(9) m = m(\psi) \quad m_\psi > 0$$

$$(10) \sigma_\omega = 1/[1 + m] = \omega(m) \quad \omega_m < 0$$

$$(11) \sigma_\pi = m/[1 + m] = \chi(m) \quad \chi_m > 0$$

$$(12) \sigma_\omega + \sigma_\pi = 1$$

$$(13) W_T = \mu\sigma_\pi \quad 0 < \mu < 1$$

$$(14) \pi = [1 - \mu\sigma_\pi]h\kappa$$

$p$  = price level,  $m$  = mark-up,  $W$  = nominal wage bill,  $\psi$  = firms' monopoly power,  $\sigma_\omega$  = wage share,  $\sigma_\pi$  = profit share,  $W_T$  = wage compensation paid to top managers as a share of profits,  $\pi$  = profit rate after payments to top managers.

Equation (8) is the mark-up pricing formula whereby firms set price as a mark-up over average total unit labor costs. Those costs include worker and middle manager pay but not top management pay. Equation (9) determines firms' mark-up 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 mark-up, while equation (12) is an accounting identity requiring the wage and profit shares 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. It 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' mark-up pricing rule. Equation (14) defines the profit rate which is reduced by the portion of profits paid over to top management as remuneration.

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

$$(15) W = W_W + W_M$$

$$(16) W_W = w_w h N_W$$

$$(17) W_M = w_M M$$

$$(18) W_W / [W_W + W_M] = \theta$$

$$(19) W_M / [W_W + W_M] = 1 - \theta$$

$$(20) \theta = \theta(e, h, x) \quad 0 < \theta(e, h, x) < 1, \theta_e > 0, \theta_h > 0, \theta_x > 0$$

$W_W$  = worker nominal wage bill,  $W_M$  = middle manager nominal wage bill,  $\theta$  = worker share of the wage bill,  $e$  = employment rate,  $x$  = exogenous institutional variable impacting worker 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 wage whereas middle managers are paid a salary. Equation (18) defines the worker 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 employment rate ( $e$ ), hours ( $h$ ), and institutional variable ( $x$ ) affecting worker bargaining power. The bargaining power variable is a catch-all that reflects features such

as unionization, 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 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 worker bargaining power. Equation (11) determines the wage share of income in accordance with Kaleckian mark-up 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 labor market bargaining power.

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

$$(21) Y = D$$

$$(22) I/K = S/K$$

$$(23) I/K = g_k = i(\pi, h) \quad i_\pi > 0, i_h > 0$$

$$(24) S/K = S_M/K + S_T/K$$

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

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

$$= s(h, \sigma_\pi, \mu, \beta_T, z_T, \kappa) \quad s_h > 0, s_{\sigma_\pi} > 0, s_{\beta_T} < 0, s_\mu > 0, s_{z_T} > 0, s_\kappa > 0$$

$$(27) z_M + z_T = 1$$

$\beta_M$  = middle managers' propensity to consume,  $\beta_T$  = top managers' propensity to consume.

Equation (21) is firms' production rule whereby firms produce to demand with variations in demand being accommodated by variations in hours of utilization. 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 utilization. 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 labor market which is described by the following two equations:

$$(28) e = N/L$$

$$(29) g_e = g_N - g_L$$

$L$  = labor force,  $g_e$  = rate of change of the employment rate,  $g_L$  = labor 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 labor 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 labor.

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, 2012d). As discussed earlier, 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 (2012d), in a two class model ownership shares will be in equilibrium when either class' share 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

$$(30) \quad g_{zT} = Z(s_T - z_T g_k) \quad Z' > 0, Z(0) = 0$$

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 top managers' share is constant, which implies the following steady-state ownership condition:

$$(31) \quad s_T = z_T g_k$$

#### 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 utilization (h), profit share ( $\sigma_\pi$ ), the profit rate ( $\pi$ ), 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

$$(32) \quad \sigma_\pi = \pi(m(\psi))$$

$$(33) \quad i([1 - \mu]\pi(m(\psi))h\kappa, h) = s(h, \chi(\psi), \mu, \theta(e, h, \rho), z_T, \beta_T, \beta_M, \kappa)$$

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

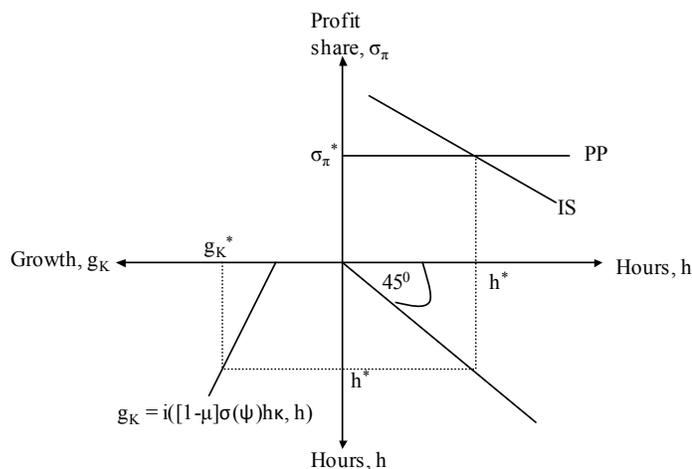
$$i_h = i_\pi \pi_h + i_h > 0, \quad i_\psi = i_\pi \pi_\psi > 0$$

$$s_h = s_h + s_\theta \theta_h > 0, \quad s_\psi = s_\chi \chi_\psi > 0, \quad s_e = s_\theta \theta_e < 0, \quad s_\rho = s_\theta \theta_\rho < 0, \quad s_{zT} > 0, \quad s_{\beta T} < 0, \quad s_{\beta M} < 0$$

The two endogenous variables are  $\sigma_\pi$  and h. Figure 2 provides a graphical determination of short-run equilibrium outcomes. The PP schedule in the northeast quadrant corresponds to equation (32) and determines the profit share. In the current model the PP schedule is horizontal and independent of hours. However, other

specifications are possible and the mark-up can be a negative function of utilization for reasons of profit squeeze by insider workers or for strategic price setting reasons (Rotemberg and Saloner, 1986). The IS schedule represents equation (33) and its slope depends on the type of regime.

Figure 2. Determination of short run equilibrium in the wage-led case.



As is well-known, economies can be wage-led, profit-led, or conflictive in the neo-Kaleckian model (Bhaduri and Marglin, 1990). In a wage-led economy an exogenous increase in the profit share lowers hours (utilization) and growth. Growth falls because the utilization effect dominates any profit share benefit. In terms of Figure 2, an upward shift in the PP schedule raises  $\sigma_\pi$  and lowers  $h$ . Conflictive economies are a sub-set of wage-led economies, but now an exogenous increase in the profit share lowers utilization but increases growth. Growth increases because the profit share effect dominates the utilization effect. In a profit-led economy an exogenous increase in the profit share raises both utilization and growth because the utilization and profit share effects work in the same direction. The conditions for a wage-led economy are shown in Table 3.

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

	Capacity utilization	Investment rate
<b>Profit-led</b>	$h_{\psi} > 0$	$i_{\pi}\pi_{\psi} + i_h h_{\psi} > 0$
<b>Wage-led</b>	$h_{\psi} < 0$	$i_{\pi}\pi_{\psi} + i_h h_{\psi} < 0$
<b>Conflictive</b>	$h_{\psi} < 0$	$i_{\pi}\pi_{\psi} + i_h h_{\psi} > 0$

The slope of the IS is given by

$$d\sigma_{\pi}/dh = [s_h - i_h]/[i_{\sigma\pi} - s_{\sigma\pi}]$$

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 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 2 shows the IS as negatively sloped, reflecting the case of a wage-led economy.<sup>5</sup> Hours and the profit share are determined by the intersection of the IS and PP schedules in the northeast quadrant. That intersection corresponds to a combination of hours and profit share consistent with both goods market equilibrium and firms' mark-up

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<sup>5</sup> 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.

pricing behavior. The southwest 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 ( $\sigma_\pi$ ,  $h$ ,  $g_K$ ) to changes in the exogenous variables ( $\psi$ ,  $\rho$ ,  $\mu$ ,  $\beta_T$ ,  $\beta_M$ ,  $e$ ,  $z_T$ ) in different regimes. These comparative statics can be derived by appropriately shifting the growth function and the IS and PP schedules in Figure 2. The effect of an increase in firms' monopoly power 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 southwest quadrant. In wage-led regimes the net effect is to lower hours and growth. In profit-led regimes it raises hours and growth, and in conflictive regimes it lowers hours but increases growth.

Table 4. Signing of short run comparative statics.

		$d\psi$	$d\rho$	$d\mu$	$d\beta_T$	$d\beta_M$	$de$	$dz_T$
<b>Wage-led</b>	$d\sigma$	+	0	0	0	0	0	0
	$dh$	-	+	-/?	+	+	+	-
	$dg_K$	-	+	-/?	+	+	+	-
<b>Profit-led</b>	$d\sigma$	+	0	0	0	0	0	0
	$dh$	+	+	-/?	+	+	+	-
	$dg_K$	+	+	-/?	+	+	+	-
<b>Conflictive</b>	$d\sigma$	+	0	0	0	0	0	0
	$dh$	-	+	-/?	+	+	+	-
	$dg_K$	+	+	-/?	+	+	+	-

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

Increases in top manager pay likely reduce hours and growth in all regimes. The logic is profits are transferred to top managers, which increases their consumption. However, the transfer reduces the profit rate, which reduces investment. It also reduces middle manager income, which reduces their consumption. The negative effect on AD likely outweighs any positive effect, shifting the IS left. At the same time, the lower profit rate shifts the growth function right. The one possible exception would be if top managers have a very high propensity to consume because of Veblenian conspicuous consumption behaviors. In that case, it is possible the IS could shift right and the increase in hours could raise growth despite the shift of the growth function.

Increased propensity to consume of middle and top managers 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 raises workers share of the wage bill, increasing AD and shifting the IS right. Finally, increases in top managers' ownership share lowers hours and growth in all regimes. That is because it shifts income 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:

$$(34.a) \quad h = h(e, z_T, \psi, \mu, \rho, \beta_T, \beta_M, \kappa) \quad h_e > 0, h_{z_T} < 0, h_\psi > 0, h_\mu < 0, h_\rho > 0, h_{\beta_T} > 0, h_{\beta_M} > 0$$

$$(34.b) \quad g_K = i(e, z_T, \psi, \mu, \rho, \beta_T, \beta_M, \kappa) \quad i_e > 0, i_{z_T} < 0, i_\psi > 0, i_\mu < 0, i_\rho > 0, i_{\beta_T} > 0, i_{\beta_M} > 0$$

The solutions for the wage-led regime are

$$(35.a) \ h = h(e, z_T, \psi, \mu, \rho, \beta_T, \beta_M, \kappa) \quad h_e > 0, h_{z_T} < 0, h_\psi < 0, h_\mu < 0, h_\rho > 0, h_{\beta_T} > 0, h_{\beta_M} > 0$$

$$(35.b) \ g_K = i(e, z_T, \psi, \mu, \rho, \beta_T, \beta_M, \kappa) \quad i_e > 0, i_{z_T} < 0, i_\psi < 0, i_\mu < 0, i_\rho > 0, i_{\beta_T} > 0, i_{\beta_M} > 0$$

The solutions for the conflictive regime are:

$$(36.a) \ h = h(e, z_T, \psi, \mu, \rho, \beta_T, \beta_M, \kappa) \quad h_e > 0, h_{z_T} < 0, h_\psi < 0, h_\mu < 0, h_\rho > 0, h_{\beta_T} > 0, h_{\beta_M} > 0$$

$$(36.b) \ g_K = i(e, z_T, \psi, \mu, \rho, \beta_T, \beta_M, \kappa) \quad i_e > 0, i_{z_T} < 0, i_\psi > 0, i_\mu < 0, i_\rho > 0, i_{\beta_T} > 0, i_{\beta_M} > 0$$

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 worker share of the wage bill due to increased worker bargaining power stimulate economic activity and growth ( $dh/d\rho > 0$  and  $dg_K/d\rho > 0$ ).

## 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:

$$(37) \ g_e = g_K - a(g_K, h, e, z) - g_L \quad a_{g_K} > 0, a_h > 0, a_e > 0, a_z > 0$$

$$= i(e, z_T, \psi, \mu, \rho, \beta_T, \beta_M, \kappa) - a(i(e, z_T, \psi, \mu, \rho, \beta_T, \beta_M, \kappa), h(e, z_T, \psi, \mu, \rho, \beta_T, \beta_M, \kappa), e, z) - g_L$$

$$(38) \ g_{z_T} = Z(s_T - z_T g_k)$$

$$= Z(s(e, z_T, \psi, \mu, \rho, \beta_T, \beta_M, \kappa) - z_T i(e, z_T, \psi, \mu, \rho, \beta_T, \beta_M, \kappa))$$

Setting equations (37) and (38) equal to zero, differentiating totally with respect to  $e$  and  $z_T$ , and rearranging then gives the slopes of the equilibrium loci for the employment rate and capitalists' ownership share. These are given respectively by:

$$dz_T/de|_{ee} = -\{i_e[1 - a_i] - a_h h_e - a_e\} / \{i_{zT}[1 - a_i] - a_h h_{zT}\} = --/+ > 0/?$$

$$dz_T/de|_{zz} = (z_T i_e - s_e) / (s_{zT} - i - z_T i_{zT}) = < 0$$

The slopes of the  $ee$  and  $zz$  schedules are theoretically ambiguous. Figure 3 shows a phase diagram in which the  $ee$  schedule is drawn as negatively sloped and the  $zz$  schedule as positively sloped. The negative slope of the  $ee$  reflects the fact that as the employment rate increases the rate of productivity growth accelerates via the endogenous growth mechanism, causing effective labor supply to start increasing and the employment rate to fall. To offset that tendency, top managers' ownership share must fall so as to increase AD, capital accumulation, and employment growth.<sup>6</sup> The positive slope of the  $zz$  schedule reflects the fact that an increase in the employment rate increases capitalist top manager saving by more than investment, necessitating a rise in their ownership share to maintain balance between capitalists' saving and the share of investment they must finance.<sup>7</sup> Given this configuration, the model economy is stable. However, other configurations that produce instability are possible.

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<sup>6</sup> Jones (1999) and Taylor (2004, p.188-189) show that the existence of steady state stability requires that the endogenous innovation effect from investment be less than unity so that  $1 - a_i > 0$ . Palley (2012b) shows that in an economy in which hours ( $h$ ) do not affect productivity growth, stability requires the numerator be negative. If hours have no effect ( $a_h = 0$ ), then the  $ee$  schedule is negatively sloped.

<sup>7</sup> With regard to the  $zz$ , the numerator is positive if the multiplier stability condition holds. That is because capitalist manager saving is more responsive to changes in economic conditions than is investment.

Figure 3. Determination of steady state employment rate and capitalist ownership share.

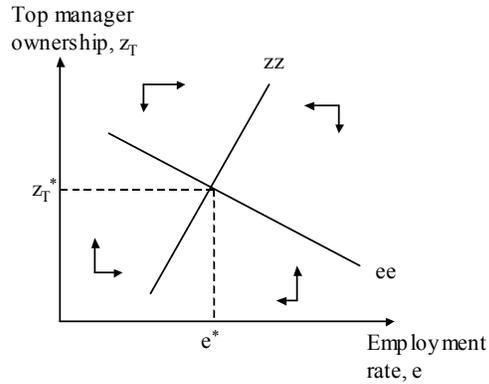


Figure 4 can then be used to assess the comparative statics impact of changes in exogenous variables on the steady state employment rate and capitalist ownership share. An increase in firms' monopoly power ( $\psi$ ) increases top manager saving, shifting the  $zz$  up. If the economy is wage-led the  $ee$  shifts left so that  $e^*$  falls while the change in  $z_T^*$  is formally ambiguous. However, given that top managers benefit proportionately more from a higher profit share than middle managers, the formers' relative saving rises so that their ownership share likely rises. If the economy is profit-led the  $ee$  shifts right. Now,  $z_T^*$  increases unambiguously and  $e$  likely increases because of the profit-led effect.

An increase in worker bargaining power ( $\rho$ ) lowers middle managers wage share, hours, which increases top manager relative saving and shifts the  $zz$  up. It also raises AD and investment, which shifts the  $ee$  right.  $z_T^*$  therefore increases unambiguously and  $e^*$  likely rises. An increase in top manager pay ( $\mu$ ) shifts the  $zz$  up and the  $ee$  left so that  $e^*$  falls unambiguously and  $z_T^*$  likely rises.

An increase in top managers' propensity to consume ( $\beta_T$ ) shifts the  $zz$  down and the  $ee$  right so that  $e^*$  rises unambiguously and  $z_T^*$  likely falls. Lastly, an increase in middle managers' propensity to consume ( $\beta_M$ ) shifts the  $zz$  up because it reduces relative saving of middle managers, and it shifts the  $ee$  right.  $z_T^*$  rises unambiguously and  $e^*$  also likely increases. These comparative statics are shown in Table 5.

Table 5. Comparative statics with respect to steady state employment and top managers' ownership share.

	$d\psi$ wage- led	$d\psi$ profit- led	$d\rho$	$d\mu$	$d\beta_T$	$d\beta_M$
$de^*$	-	+/?	+/?	-	+	+/?
$dz^*$	+/?	+	+	+/?	-/?	+

The comparative static signings 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 6. Increased firm monopoly power tends to lower growth in the wage-led economies and raise it in profit-led economies. Increased worker bargaining power tends to raise growth. Increased top manager pay lowers growth. Increased top manager propensity to consume raises growth, while increased middle manager propensity to consume tends to also raise growth. In some cases, the effect is theoretically ambiguous because the direct impact and induced employment impact on growth are countered by induced changes in ownership shares that have an opposite signed effect.

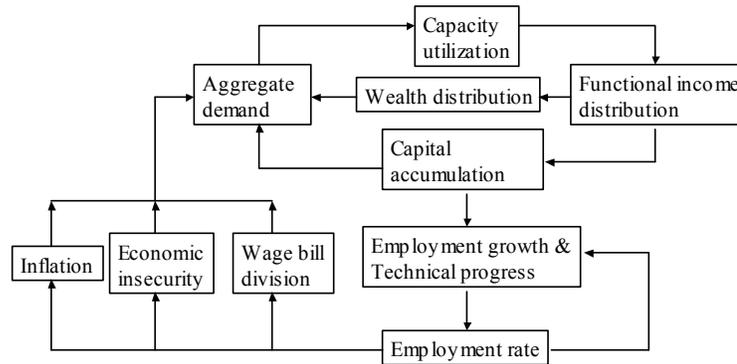
Table 6. Comparative statics for steady state growth.

$di/d\psi =$ <b>(wage-led)</b>	$i_e e_\psi = +-$	$i_{zT} z_{T\psi} = -+$	$i_\psi = -$	$\Sigma = -$
$di/d\psi =$ <b>(profit-led)</b>	$i_e e_\psi = ++$	$i_{zT} z_{T\psi} = -+$	$i_\psi = +$	$\Sigma = +/?$
$di/d\rho =$	$i_e e_\rho = ++$	$i_{zT} z_{T\rho} = -+$	$i_\rho = +$	$\Sigma = +/?$
$di/d\mu =$	$i_e e_\mu = +-$	$i_{zT} z_{T\mu} = -+$	$i_\mu = -$	$\Sigma = -$
$di/d\beta_T =$	$i_e e_{\beta_T} = ++$	$i_{zT} z_{T\beta_T} = --$	$i_{\beta_T} = +$	$\Sigma = +$
$di/d\beta_M =$	$i_e e_{\beta_M} = ++$	$i_{zT} z_{T\beta_M} = -+$	$i_{\beta_M} = +$	$\Sigma = +/?$

## 6. 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 (2012b). That model 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 4 which is an augmented version of Figure 1.

Figure 4. Structure of the neo-Kaleckian - Goodwin growth and distribution model with a wage bill division, inflation rate, and economic insecurity channel.



## 7. Political economy and conclusions

To conclude the paper, we now turn to the political economy implied by the model, along with some suggestions for the model's future development. As regards the top manager class, it has an economic interest in increasing both the profit share ( $\sigma_\pi$ ) and the share of profits paid top manager pay ( $\mu$ ). Top managers are macroeconomically parasitic, with their pay reducing business profitability, and thereby reducing capital accumulation and growth. That said, top managers may still have a microeconomic control function, acting 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. As regards top managers, 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 suffers from top manager pay which reduces the profits it receives, and that places it in opposition to the top manager class.

As regards workers, the middle class is allied with workers because it benefits from an increased wage share ( $\sigma_w$ ) that increases the amount for wage bill division. However, it is in conflict with workers over the division of the wage bill ( $\theta$ ).

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 reduces the wage share, while the latter reduces employment and growth. The one exception is if the economy is profit-led in which case accumulation and growth that benefits workers may be increased by a higher profit share and lower wage share. 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. Workers are aligned with the middle manager class in the desire for a higher wage share, but are in conflict 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 that is not necessarily the case. This is hinted at in current discussions of U.S. tax reform which define the middle class as having an income of up to one million dollars in some quarters, and up to two hundred and fifty thousand in most other quarters.

There are strong reasons to believe 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 which increases the profit share, and worker bargaining power that

increases workers' share of the wage bill. In practice, it is likely that the institutions and policies that increase firms' monopoly power also decrease worker bargaining power. Such developments benefit both the top manager and middle manager class, giving the middle class reason to ally politically with the top manager class. That is the lesson of the thirty year attack on unions and corporate globalization.

The working class may also choose to ally politically with the top manager class. However, in the current model that can only be because of aspirational false consciousness whereby individual workers see themselves as becoming part of the top manager class. Such worker false consciousness is either a form of Lake Wobegon effect whereby everybody views themselves as above average and therefore likely to make the class leap, or a form of lottery purchase behavior 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 labor.<sup>8</sup> At the macroeconomic level there is little change because skilled and unskilled workers have no saving so that there are no AD effects from wage redistributions between skilled and unskilled workers. However, at the microeconomic and political level there can be significant effects. Suppose skilled wages are an institutionally determined multiple of unskilled wages given by:

$$(39) w_S = \varphi(x)w_U \quad \varphi > 1, \varphi_x > 0$$

$w_S$  = skilled wage,  $w_U$  = unskilled wage,  $x$  = 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

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<sup>8</sup> Divisions related to race and gender can play the same role as a skilled versus unskilled division.

from an alliance with unskilled workers and seek out 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 manager pay as follows:

$$(40) v = \phi[1 - \mu]\sigma\pi \quad 0 < \phi < 1$$

$v$  = 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 over the past thirty years which has directed worker 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.

In sum, a three class neo-Kaleckian growth model provides a rich framework for analyzing 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. That is because the middle class is identified with middle management and having a significant ownership share of the capital stock. Given that narrower definition, the middle class can be a political force for increased income inequality and slower growth.

The narrower definition also suggests chatter about a large middle class constitutes part of a political dialogue that encourages workers to develop a false identity

that prompts them to support policies counter to their interest. Developing a new political dialogue that better reflects the reality of class economic interests is a critical political challenge. Redefining downward the top income threshold defining the middle class would go part of the way. However, it does not address the issue of false consciousness among workers regarding ownership.

## References

- Bhaduri, A. and S.A. Marglin (1990): "Unemployment and the real wage: the economic basis for contesting political ideologies," *Cambridge Journal of Economics*, 14, 375 – 93.
- Blanchflower, D.G., and Oswald, A.J. (1990): "The wage curve," *Scandinavian Journal of Economics*, 92, 215-35.
- Blanchflower, D.G., and Oswald, A.J. (1994): *The Wage Curve*, Cambridge: MIT Press.
- Dutt, A.K. (1984): "Stagnation, income distribution and monopoly power," *Cambridge Journal of Economics*, 8, 25 – 40.
- Dutt, A.K. (1990): "Growth, Distribution and Capital Ownership: Kalecki and Pasinetti Revisited," in B. Dutta, S. Gangopadhyay, D. Mookherjee, and D. Ray (eds.), *Economic Theory and Policy: Essays in Honor of Dipak Banerjee*, Bombay: Oxford University Press, 130 – 145.
- Dutt, A.K. (2006): "Aggregate demand, aggregate supply and economic growth," *International Review of Applied Economics*, 20 (July), 319 – 36.
- Goodwin, R.M. (1967): "A growth cycle," in Feinstein, C.H. (ed.), *Capitalism and Economic Growth*, Cambridge: Cambridge University Press, 54 – 58.
- Hein E. and Tarassow (2010): A., "Distribution, aggregate demand and productivity growth: theory and empirical results for six OECD countries based on a post-Kaleckian model," *Cambridge Journal of Economics*, 34 (4), 727 – 754.
- Jones, C.I. (1999): "Growth: With or without scale effects?" *American Economic Review*, 89 (2) (May), 139 – 144.
- Kaldor, N. (1957): "A model of economic growth," *Economic Journal*, 67, pp.591 – 624.
- \*Kalecki, M. (1970): "The class struggle and the distribution of national income," *Kyklos*, 24(1), pp.1 – 8.
- Lavoie, M. (1995): "The Kaleckian model of growth and distribution and its neo-Ricardian and neo-Marxist critiques," *Cambridge Journal of Economics*, 19, 789 – 818.
- Lavoie, M. (2009): "Cadrisme within a Post Keynesian Model of Growth and Distribution," *Review of Political Economy*, 21(3), pp.369 – 91.
- 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*, 30, 403 – 43.

- Naastepad, C.W.M., and Storm, S. (2006/07): "OECD demand regimes (1996 – 2000)," *Journal of Post Keynesian Economics*, 29 (Winter), 211 – 46..
- Palley, T.I. (1996): "Growth theory in a Keynesian mode: some Keynesian foundations for new growth theory," *Journal of Post Keynesian Economics*, 19, 113 – 35.
- Palley, T.I. (1997): "Aggregate demand and endogenous growth: A generalized Keynes - Kaldor model of economic growth," *Metroeconomica*, 48 (June), 161-76.
- Palley, T.I. (2005): "Class conflict and the Cambridge theory of distribution," in B.Gibson (ed.), *The Economics of Joan Robinson: A Centennial Celebration*, Cheltenham: E. Elgar.
- Palley, T.I. (2012a): *From Financial Crisis to Stagnation: The Destruction of Shared Prosperity and the Role of Economics*, Cambridge University Press.
- Palley, T.I. (2012b): "A neo-Kaleckian - Goodwin model of capitalist economic growth: Monopoly power, labor market conflict, and endogenous technical progress," *Cambridge Journal of Economics*, under revision.
- Palley, T.I. (2012c): "Growth, Unemployment and Endogenous Technical Progress: A Hicksian Resolution of Harrod's Knife-Edge," *Metroeconomica*, 63 (3), pp.512 – 541.
- Palley, T. I (2012d), "Wealth and Wealth Distribution in the Neo-Kaleckian Growth Model." *Journal of Post Keynesian Economics*, 34 (Spring), 449 – 470.
- Pasinetti, L. (1962), "Rate of Profit and Income Distribution in Relation to the Rate of Economic Growth," *Review of Economic Studies*, 29, 267 - 79.
- Rada, C. (2007): "Stagnation or transformation of a dual economy through endogenous productivity growth," *Cambridge Journal of Economics*, 31 (May), 711 – 740.
- Rotemberg, J.J., and Saloner, G. (1986): "A super-game theoretic theory of price wars during booms," *American Economic Review*, 76, 390 – 407.
- Rowthorn, R. (1982): "Demand, real wages and growth," *Studi Economici*, 19, 3 – 54.
- Taylor, L. (1983): *Structuralist Macroeconomics*, Basic Books: New York.
- Taylor, L. (2004): *Reconstructing Macroeconomics: Structuralist Proposals and Critiques of the Mainstream*, Harvard University Press: Cambridge, MA.
- Uzawa, H. (1961): "Neutral inventions and the stability of growth equilibrium," *Review of Economic Studies*, 28(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, Conditions of Work and Employment Branch, International Labor Office, Geneva.

Verdoorn, P.J. (1949): “Fattori che regolano la sviluppo della produttività del lavoro (factors governing the growth of labor productivity),” *L’Industria*, 1, 3 – 10 (English translation by Thirlwall, A.P. and Thirlwall, G. (1979), reprinted in Ironmonger, D., Perkins, J.ON., Tran, V.H. (eds), *National Income and Economic Progress*, Macmillan: Melbourne, Australia, 1988).