METROECONOMICA
INTERNATIONAL REVIEW OF ECONOMICS

Metroeconomica 00:00 (2015) 00–00
doi: 10.1111/meca.12102

GROWTH AND DISTRIBUTION IN HETERODOX MODELS WITH MANAGERS AND FINANCIERS

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(November 2014; revised August 2015)

ABSTRACT

Heterodox models of income distribution and growth generally have two classes: workers and capitalists. However, recent discussions of inequality have drawn attention to changes in income distribution due to wage inequality and to an increase in the income and wealth of the top income group. To take these changes into account, this paper uses a simple two-group framework to develop simple classical-Marxian and post-Keynesian-Kaleckian models, in which one group consists of production workers who also own capital and another group consists of managers and financiers, as well as traditional capitalists, to analyze the determinants and growth implications of distributional changes.

1. INTRODUCTION

Heterodox models of growth and distribution—whether along classical-Marxian or post Keynesian lines—typically focus on the distribution of income between capitalists and workers. The distinction between these two classes combines different concepts of distribution and related ideas about inequality: between the factors of production, capital and labor (referring to functional income distribution); between the rich capitalists and poor

* I am very grateful to the Institute for New Economic Thinking (INET) for a grant which supported the research reported in this paper. Comments of participants at sessions at the European Association for Evolutionary Political Economy (EAEPE) Annual conference at Université Paris Nord, Campus Bobigny, and the Analytical Political Economy Workshop at Wesleyan University, and at seminars at: Colorado State University; Federal University of Minas Gerais, Belo Horizonte, Brazil; the Indian Institute of Management, Calcutta, India; and the University of Sao Paulo, Brazil, especially of Laura Carvalho, Firat Demir, Gilberto Lima, Gil Skillman, Peter Skott, and Roberto Veneziani, on some of the ideas presented in the paper, are greatly appreciated. The useful comments and suggestions of two anonymous referees for this journal are also gratefully acknowledged.

workers (referring to vertical inequality) and between different classes of people with different behaviors and interests (referring to an example of horizontal inequality).

Recent discussions of income inequality, however, have focused mostly on vertical inequality. Attention has been focused on the income share of the top 1 per cent of income recipients, and even the top 0.1 per cent, and it has been demonstrated that these shares have increased significantly in many countries (see Alvaredo *et al.*, 2013, for a recent overview, and Piketty, 2014, for a more detailed discussion). Especially in high-income capitalist countries, many people not at the top of the income ladder, including those who can be called members of the middle class and obtain most of their income from wages, also own capital, even if primarily in the form of pension plans for retirement purposes. Thus, the worker–capitalist divide seems to have become blurred. Furthermore, inequality within labor income has increased, suggesting that the capitalist-workers distinction may not tell the whole story, or even the major part of the story, of rising inequality. A well publicized, although short-lived, protest movement in the United State, called Occupy Wall Street, with similar movements in several other countries, has drawn attention to the divide between the top 1 per cent and the rest.

This paper develops simple models of growth and distribution along classical-Marxian and post Keynesian lines (arguably the two best-known heterodox approaches to growth and distribution dynamics) distinguishing between two groups of people—who can be called the "best" and the "rest" for rhyme though not for reason—which will be referred the "top" and the "rest". The distinction focuses on vertical inequality and not on functional distribution, because, as we shall see, both groups receive both labor and capital income, and it is not obvious what it has to do with horizontal inequality.

To proceed along these lines we need to characterize the members of the two groups. It appears from recent studies that in countries such as the United States the top 1 per cent is comprised mostly of top-level managers, including CEOs of corporations, and financial executives (see Bivens and Michel, 2013, for a review) and perhaps others who are professionally tied to them (such as lawyers, accountants, middle-high level managers and the like). The explanation for the increase in the share of this top 1 per cent is argued to lie more in the greater opportunities and incentives that people in this group have had for increasing their incomes, resulting from changes in laws, regulations and norms in the financial and corporate sectors, and especially in changes in tax laws and financial liberalization that increase incentives of high-income groups to increase their income shares, rather than in technological changes and other reasons that increase in the productivity of high income groups (see Stiglitz, 2012; Alvaredo *et al*., 2013; Bivens and Michel, 2013). Changes in the laws and norms have also been the result of increases in the power of the top income groups, which has increased their influence on legislators and other policymakers. The higher incomes have often been described as returns to rent-seeking activity rather than to productive activity. To reflect all this this, and to draw on the literature on the causes of rising inequality, we will characterize the "top" as consisting of a composite group of top managers and financiers, and the "rest" as comprising of everyone else.

The analysis of this paper draws on several strands of the heterodox literature on growth and distribution. The first strand is a fairly sizeable one on financiers and financialization, some contributions to which introduce financiers or rentiers as a third class in addition to workers and capitalists. This literature has usually adopted the post Keynesian assumption of a horizontalist supply of money at an exogenously given interest rate, and examined the implications of changes in the interest rate, with financiers or rentiers receiving interest and capitalists receiving profits (see Dutt, 1989, 1992). The interest rate has continued to play a major role in models analyzing the macroeconomic effects of financialization, which have characterized this process in terms of an increase in the interest rate and other parameters involving the retained earnings of firms and dividend payments (which tend to reduce retained earnings), and the effect of interest rate changes on the income share of workers (see, for instance, Hein and van Treeck, 2010). A second literature has examined the role of managers and managerial capitalism. With the rise of managerial capitalism, and the recognition of the distinction between owners and management (see, for instance, Marris, 1964; Galbraith, 1967) a distinction has been drawn between owners of capital and managers. Although the early models examining the role of managers did not explicitly include a separate managerial class, only examining how the existence of managers affect the behavior of the firm and implied managerial constraints on the expansion of firms, some recent contribution have explicitly examined a third class of managers, who organize production (see, for instance, Lavoie, 2009, Dutt, 2012; Palley, 2015 and Tavani and Vasudevan, 2014). A third, and long, literature allows saving by workers in heterodox models of growth and distribution, starting with the pioneering contributions of Kaldor (1955–56) and Pasinetti (1962), where the latter explicitly takes into account saving by workers and capital owned by them as well as by capitalists. The model developed in this paper stays within the two-class framework in which both classes save and hold capital, in line with the literature deriving from Pasinetti (see Dutt, 1990a). However, it departs from this framework by allowing the upper-income group to receive wages as managers, in addition to capital income, following the literature that introduces managers, without having them as a third class. A similar approach is taken by Palley (2014) who also amalgamates managers and capitalists, thereby allowing both classes in his two-class model to receive wages and capital income. The model of this paper, unlike in Palley's, also includes financiers, as in the literature on financiers and financialization, and places them within the high-income group.

The rest of this paper proceeds as follows. Section 2 develops a simple framework for examining growth and income distribution. Sections 3 and 4 develop classical-Marxian and post Keynesian models using this framework to examine the implications of parametric changes that change the income and capital share of the "top". Section 5 concludes.

2. A SIMPLE FRAMEWORK

We assume that there are two groups of people in the economy, the top income recipients—who will be referred to as the "top"—perhaps the top 1 per cent of income recipients, but the precise share of population need not be specified—and the rest. The basic categories, therefore, refer to persons and not functions, and personal income distribution is vertical rather than horizontal although, as we shall argue later, they are not unrelated to horizontal groupings.

Each income group receives income from two broad categories, that is, labor or wage income and capital or profit income. Thus, we have

$$Y_i = w_i L_i + \Pi_i \tag{1}$$

where the subscript i refers to the personal income groups T and R, denoting the top and the rest, Y_i to total real income, w_i the real wage, L_i the level of employment and Π_i the non-wage or capital income of each group i.

To keep things as simple as possible we assume that the economy produces one good with two basic factors of production, labor and capital, where labor is of two types, production labor and managerial labor. We assume that the production relation is of the fixed coefficients form, so that we can write it as

$$Y = \min\left[\frac{L_p}{a},\ bK\right] \tag{2}$$

where Y is total real production and income, L_p the employment of production labor (which henceforth, unless otherwise specified, will be referred to simply as labor), K, the amount of homogenous capital, a, the labor requirement per unit of output and b, the maximum output-capital ratio.[1] Managers do not enter into this production function for now, but we assume that the production relation implies the existence of top managers, without whom production could not be organized in terms of it. Increasing the number and/or quality of managers can change the production coefficients, something to which we will return later.

We assume that the rest supplies only production labor, so that we have

$$L_R = L_P \tag{3}$$

and that those at the top only engage in top managerial and financial activities. We assume that the number of people in top management positions is a constant fraction of total capital, so that[2]

$$L_T = \tau K \tag{4}$$

We also assume that the real wages of the two types of labor, w_R and w_T, are fixed. We will denote the ratio of the two wages by α, so that we have

$$w_T = \alpha w_R \tag{5}$$

[1] We do not distinguish between non-supervisory workers and supervisory workers, or between low-skilled and high-skilled workers, aggregating them all into production workers. We can assume that a change in the composition of labor between these groups affects a and the wage of labor as well. We abstract from changes in the composition of labor between the groups for simplicity. For a model with high- and low-skilled workers along classical-Marxian lines, see Dutt and Veneziani (2011−12).

[2] This assumption is made to allow an increase in the income of the top when the economy grows due to capital accumulation, and thereby allow—as we shall see—for the possibility of constant shares of income of the two classes at long-run equilibrium. The assumption can be defended by noting that, for simplicity, the bulk of the 'labor' performed by the top consists of 'high-level' managerial work (consisting not only of CEOs but other officers at high levels to whom CEOs delegate some of their tasks), the amount of it being proportional to capital stock, and that 'labor' in the financial sector does not depend on the size of the financial sector and is negligible in quantity so that it can be treated as zero, or that the 'labor' performed by the top is both managerial and financial in nature and both increase with capital stock.

where α is a measure of wage inequality. We assume that unemployed labor always exists in the economy, and whatever labor is needed for production and other purposes can be obtained, so that labor supply is never a constraint for the economy.[3]

We assume that both the "top" and the "rest" save a constant fraction of their income, given by s_T and s_R, and because those at the top are richer, and because the rich typically save a higher fraction of their income, $s_T > s_R$. As both groups save, both groups own wealth. For simplicity and to abstract from explicit consideration of asset markets and asset prices, we assume wealth to take the form of physical capital. As there are only two groups and all capital is owned by members of the two groups, we have[4]

$$K = K_T + K_R \tag{6}$$

The rest receive income from property at the exogenously given interest rate i_0, so that

$$\Pi_R = i_0 K_R \tag{7}$$

The top receive capital income in two forms. First, they receive a return as financiers, by borrowing at the rate i_0 and lending to firms at a rate given by

$$i = i_0(1 + \mu) \tag{8}$$

where μ is the markup rate in the financial sector, which is exogenously given. Second, they receive dividends from the profits firms distribute after the latter retain a fixed fraction ρ of their net profits after payment of wages and interest. These assumptions capture in a simple way the notion that different owners of capital often (predominantly) hold different types of financial assets with different rates of return (see also Pasinetti, 1983), and the top receive income from capital in a number of different ways. Thus, the capital income of the top is given by

$$\Pi_T = i_0 \mu K_R + (1 - \rho)\Pi_F \tag{9}$$

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[3] We do not explicitly model the mobility between the top and the rest (and the unemployed), but it may occur within this model due to changes in the demand for different kinds of labor. What we do not analyze is the process of mobility at the micro level (which determines who will move from one category to another, for instance due to individual decisions on saving and education, wheeling and dealing, social connections or luck).

[4] The capital 'owned' by firms is therefore actually owned by the capitalists, the firms having no net worth in this model.

where Π_F, the net profit of firms is given by

$$\Pi_F = Y - w_R L_R - w_T L_T - iK_R \tag{10}$$

Total saving in the economy is given by

$$S = s_R Y_R + s_T Y_T + \rho \Pi_F \tag{11}$$

Substituting equations (1) through (5) and (7) through (10) into (11) and dividing by K we get

$$\begin{aligned}\frac{S}{K} &= [s_R w_R a + (\rho + s_T(1-\rho))(1 - w_R a)]u - w_T \tau \ \rho(1 - s_T) \\ &\quad - [s_T - s_R + \rho(1 - s_T)(1 + \mu)] i_0 k_R\end{aligned} \tag{12}$$

where $u = \frac{Y}{K}$ is a measure of capacity utilization, and $k_R = \frac{K_R}{K}$ is the share of the rest in total capital. This expression shows that saving as a ratio of capital stock is affected by three terms which depend, respectively, on u, $w_T\tau$, and k_R. The first term shows that overall saving depends on the weighted average of saving out of production income received by the rest and the top, the weights being their income shares out of income from production. The share of income from production of the rest is $w_R a$, while the share of the top, ignoring income from managerial labor, is $1 - w_R a$, and the saving rates s_R and $(\rho + s_T(1-\rho))$ is applied to them, where the latter expression is the sum of the saving rate of the top and the retained earnings of firms which are entirely saved. The second term is the adjustment to saving due to the payment of wage income to the top, given the fact that this payment reduces the aggregate saving rate as the firms save all of profits while the top save only a fraction of their income. The third term shows the effect on the saving rate due to interest payments and receipts of firms, the top and the rest. Saving by the rest increases the overall saving compared to what it would be in the absence of interest receipts by the rest, as a higher proportion of total income would then be saved. Higher interest receipts by the rest will reduce overall saving from the level of saving by the top and firms as their income is being transferred to the rest. as $s_T > s_R$ the last term is negative, that is, a higher k_R will imply a lower saving-capital ratio due to the transfer of income to the low-saving rest.

We assume, for simplicity, that capital does not depreciate, so that the growth rate of capital is given by

$$\hat{K} = g \tag{13}$$

where $g = \frac{I}{K}$ is investment as a ratio of capital stock and I is real investment and where the overhat denotes the rate of growth of the variable under it. The rate of change of the capital stock owned by the rest is given by

$$\dot{K}_R = s_R Y_R \tag{14}$$

where the overdot denotes the time derivative. It should be noted that, as equation (6) holds so that all capital not owned by the rest is owned by the top (with firms having no net worth), the capital stock owned by the top grows according to the saving by the top and the undistributed profits of firms.

Having presented the general framework and its equational structure, we may make five remarks about it.

First, the growth and distributional dynamics of the economy can be analyzed by examining changes in K, K_T, and K_R over time. The rate of growth of the economy can be measured by g, the rate of capital accumulation which is also the rate of output growth if the rate of capacity utilization is constant. The distribution of wealth can be measured by the shares of capital owned by the rest and the top. A measure of the distribution of income is the share of income going to the rest, that is,

$$\sigma_R = w_R a + \frac{i_0 k_R}{u} \tag{15}$$

The share going to the top is not really the remaining part of income, as a part of income consists of saving by firms, but as the top are being treated as owners of the firms, we can measure their share as $1 - \sigma_R$. Other widely-used measure of inequality relate to wage inequality which, in our framework, is measured by $\alpha = \frac{w_T}{w_R}$, and the distribution of labor income, $\frac{w_T L_T}{w_R L_R} = \frac{\alpha\tau}{au}$.

Second, we may discuss the roles of different factors of production in the economy. The workers in the rest obviously provide labor for production, working with physical capital to produce output. Top managers are in charge of the overall organization of production. There has been some debate about what such organizers, who have been referred to as the bosses (although bosses can also be owners), really do. Marglin (1974), making use of historical observation and theoretical reasoning, has argued that bosses are not really necessary for production or for overall efficiency, and that they make themselves seem indispensable by making workers perform specific and narrow functions within the production process, to divert a portion of total production to themselves as capitalist surplus. According to Marglin, this activity increases the rate of saving and accumulation compared to what it would be in the absence of bosses (as bosses save while workers do not, or at least save a higher proportion of their income than do workers), but does not increase the efficiency of production. Landes (1986), relying on historical material, argues that bosses actually do increase productive efficiency by organizing production, and suggests that it is not very sensible to think of a counterfactual utopia without bosses in which workers can organize production to produce just as efficiently. We can sidestep this debate and think of top managers as organizing production to both increase labor productivity and reduce the labor share, that is, reduce $w_R a$, to increase the surplus. This may occur simply due to a reduction is w_R without a change in a, as argued by Marglin, or also (or only) because of a reduction in a, as Landes would have it, but the point is that top managers have the effect of increasing the surplus after the wages of production labor, that is, $\pi = 1 - w_R a$, are paid (without subtracting other costs involving payments to top managers and for contractually fixed interest payments). We can extend this argument by taking into account changes in the surplus due to increases in the quantity and quality of managerial activity. More managers obviously increase managerial activity. Increasing top management pay increase their "quality" in a manner analogous to efficiency wages, although the increasing power of top managers is likely to have a role as well in both reducing the wage and increasing productivity. There are many ways through which the surplus can increase in this way, that is, by introducing new technology and new organizational methods, by changing work norms, and by weakening labor unions, methods which—of course—may well be reinforce each other, and which are sometimes referred to euphemistically as business restructuring or rationalization.

Third, the dynamics of the economy can be analyzed using the rate of growth of the state variable k_R, given by

$$\hat{k}_R = \hat{K}_R - \hat{K}$$

which, using equations (1) through (3), (7), (13) and (14), implies

$$\hat{k}_R = s_R\left(w_R a \frac{u}{k_R} + i_0\right) - g$$

or

$$\dot{k}_R = s_R w_R a u - (g - s_R i_0) k_R \tag{16}$$

However, our framework has insufficient structure to examine these dynamics, as u and g are unknowns. In the next two sections we will examine two fully specified models that represent two well-known heterodox traditions, that is, the classical-Marxian and post-Keynesian–Kaleckian ones, without entering into a discussion on whether they provide faithful formalizations of these traditions.[5]

Fourth, if we develop fully-specified models from our general framework, we can examine the effects on economic growth and the distribution of income and wealth of a variety of exogenous changes in the economy. Given the purposes of this paper we will confine our attention to a discussion of the effects of what has been called "financialization" and the rise of top managers. The former will be denoted by an increase in μ, the "profit" derived from finance, the rate of interest at which firms borrow, and a reduction in s_F, which increases dividend payouts.[6] The latter will be denoted by an increase in w_T or an increase in α, that is, an increase in the wages or number of top managers. Taking into account our comments on what managers do we will also examine the "direct" effects of these changes (without considering changes in π) as well as the "indirect" effects, through increases in π, the increase in the share of the surplus after the payment of wages to production labor. We will not examine the effects of other changes in a systematic manner, although we will in some cases consider the further consequences of some of these parametric changes on other parameters that are treated as exogenous in our analysis. For example, we will examine the effects of changes in employment growth on the production labor share in income, which is taken to be exogenous in our model (other than being dependent on the managerial parameters τ and w_T). We should also note that the changes in these parameters will formally be treated as exogenous changes without explaining why they may have changed. However, as commented on later, our analysis can be linked to explanations of changes in these parameters, some of which may be "endogenous" to our model in a broader sense.

Finally, the heterodox traditions on which this paper builds can be distinguished from an orthodox or neoclassical one, in which the rate of

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[5] This follows the approach of Marglin (1984) and Dutt (1990b) in starting with a general framework for examining growth and distribution and then using alternative closures to obtain alternative models. The classical-Marxian model of section 3 is similar to the neo-Marxian model of Marglin (1984) and Dutt (1990b) and the post-Keynesian–Kaleckian model of section 4 is similar to the Kalecki-Steindl model of Dutt (1990b). Other models could also be developed, such as a neo-Keynesian model which is similar to the post-Keynesian–Kaleckian one, except that the economy is always at full capacity and the markup is endogenous, but we confine our attention to these two.

[6] There is a large and growing literature on 'financialization' in heterodox economics. For a survey of the concept and how it is represented in these ways in some heterodox growth models, see Hein and Van Treeck (2010).

growth of the economy is determined by what is called its "natural" rate of growth, that is, the growth rate of labor supply and the rate of technological change, in which—as in old and new neoclassical growth models—the economy grows with its labor fully employed. A model (although without a full set of formal equations) and an historical account using it that examines changes in inequality along neoclassical lines has recently been developed by Piketty (2014) assuming full employment growth with factor substitution between labor and capital. In this account the growth rate of output is seen to fall over time due to a diminution of the rate of growth of population with the spread of the so-called demographic transition and to the slowdown of technological change because of the exhaustion of possibilities of technology transfer. The capital-output ratio has had a tendency to rise over time under capitalism, apart the special conditions brought about by wars and the Great Depression from most of the first half of the twentieth century, up to the end of World War II, which Piketty explains has been caused mainly by reduction in the growth rate of output. Finally, Piketty argues that the elasticity of substitution in production between capital and labor is greater than unity, which implies that the rise in the capital-output ratio has not led to a large change in the ratio between the return to capital and the real wage, implying that there has been an increase in the share of capital income, or an increase in inequality. Piketty's model differs from ours because he assumes full employment growth while our models allow for unemployment, and he allows for factor substitution while we assume fixed coefficients (although this assumption can be relaxed without changing the qualitative nature of our results). Piketty's account of changes in inequality is quite different from ours, which emphasizes changes in the relative power of different groups in the economy, which affects both growth and distribution. It should be noted that Piketty's informal discussion of the causes of distributional changes—as opposed to his neoclassical theoretical framework—invoke the kinds of political-economy issues emphasized in the models of this paper, that is, tendencies that have resulted in increases in the income of top management and financiers, and the rise in the importance of inherited wealth, where (such as Keynes in *The General Theory*) he seems to (struggle to) escape from the straight-jacket of neoclassical (for instance, marginal productivity) theory of full employment growth.[7]

[7] Without entering into a discussion of the many differences between Piketty's analysis and that of this paper, it should be noted that this paper is strongly influenced by the painstaking empirical work that Piketty has done with his coauthors, and shares many aspects of Piketty's vision of capitalism and his normative considerations.

3. A CLASSICAL-MARXIAN MODEL

For the classical-Marxian model we assume that full capacity utilization always prevails,[8] so that

$$u = b \tag{17}$$

and that investment is determined by saving, so that

$$g = \frac{S}{K}. \tag{18}$$

Classical-Marxian competition induces each firm to produce as much as they can, implying that they produce at full capacity. As all saving is invested, there is no effective demand problem, which is consistent with full capacity production.[9] The central classical-Marxian feature of the model is the existence of unemployed labor, which is related to the assumption that the real wages of all kinds of labor are taken to be fixed.

For the short run we assume that k_R is given. Substituting equations (17) and (18) into equation (12) we obtain

$$\begin{aligned} g = {} & [s_R(1-\pi) + (\rho + s_T(1-\rho))\pi]b - w_T\tau\ \rho(1-s_T) \\ & - [s_T - s_R + \rho(1-s_T)(1+\mu)]i_0 k_R \end{aligned} \tag{19}$$

This shows that an increase in the given level of k_R implies a fall in g. A rise in the share of capital owned by the rest reduces total saving by redistributing income from property from the top—who have a higher saving rate—to the rest—who have a lower saving rate, and by reducing the net profits of firms which have to pay a higher interest cost because they are more heavily indebted to the rest and rely less on financing through stocks. The relation between g and k_R is shown in figure 1 as the IS curve. We assume that the condition

$$[s_R(1-\pi) + (\rho + s_T(1-\rho))\pi]b > w_T\tau\ \rho(1-s_T)$$

which states that the expression for total saving out of income, when payment of interest is not taken into account, is positive, is satisfied as,

[8] We may interpret 'full' capacity utilization to be some exogenously-given 'normal' rate of capacity utilization rather than a technologically given one.

[9] Not all Marxists would agree with this depiction of Marx's ideas. However, most classical-Marxian models make this assumption; see Dutt (2011) for a discussion of this characteristic of classical-Marxian models.

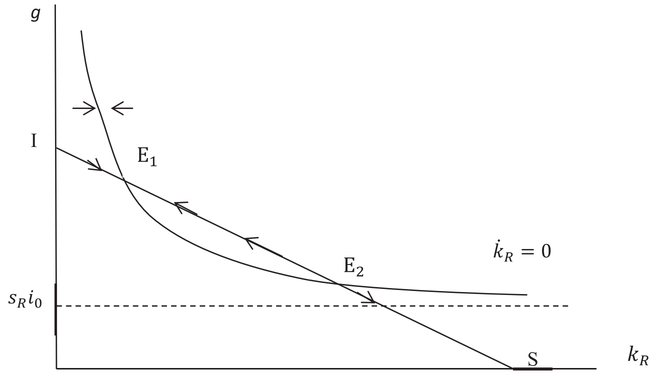

Figure 1. Classical-Marxian model.

without it and given our assumptions, no positive investment is possible. This condition ensures that the vertical intercept of the IS curve is positive. The distribution of income between the two groups is given by

$$\sigma_R = 1 - \pi + \frac{i_0 k_R}{b} \tag{15'}$$

In the long run k_R may change. The rate of change of k_R, found by substituting equation (17) into equation (16), is

$$\dot{k}_R = s_R(1 - \pi)b - (g - s_R i_0)k_R \tag{20}$$

For $\dot{k}_R = 0$, that is, for stationary k_R, we require

$$g = s_R i_0 + \frac{s_R(1 - \pi)b}{k_R} \tag{21}$$

This equation is shown by the line marked $\dot{k}_R = 0$, with the line having the vertical axis as its vertical asymptote and $g = s_R i_0$ as its horizontal asymptote. As our assumptions imply $g > s_R i_0$, equation (20) shows that points to the right of the line imply that $\dot{k}_R < 0$ and those to the left imply that $\dot{k}_R > 0$, explaining the direction of the horizontal arrows. As equation (19) is always satisfied in the long run (as the short-run equilibrium condition always holds), the economy must always be on the IS curve in the figure. Thus the movement of the economy along that curve is shown by the arrows along the IS curve. The economy will be at a long run equilibrium when $\dot{k}_R = 0$, that is, when it is at the intersection of the $\dot{k}_R = 0$ curve and the IS curve. We see that there will be two equilibria, at E_1 and E_2, the former being stable and the latter unstable. If the economy starts at a level k_R lower than the level given by E_2, it will converge to the long-run equilibrium at E_1. But if it starts at a higher level than what is given by E_2, the economy will keep traveling down the IS curve with increasing k_R and falling g. The reason for the instability is that for a sufficiently high k_R, g can become small enough to imply that an increase in k_R will reduce g sufficiently such that the effect of an increase in k_R on $\dot{k}_R$ becomes positive, despite the fact that $g > s_R i_0$ (as required by the fact that we are above the asymptote of the $\dot{k}_R = 0$ curve at which $g = s_R i_0$).

Starting from an initial long-run equilibrium at E_1, we now examine the implications of parametric changes that have typically been argued to lead to increases in the share of income going to the top, that is, increases in the share going to top managers and to financiers.

Regarding finance, we examine the effects of an increase in μ, the financial markup, and a reduction in ρ, which increases dividend payments to shareholders. The increase in μ and the fall in ρ both shift the IS curve downward: higher interest costs and lower firm saving reduces total saving and therefore investment for any level of k_R, while leaving the $\dot{k}_R = 0$ unchanged. The short-run effect, at a given k_R is to reduce saving and investment, without having any effect on output. In the long run, the reduction the rate of capital accumulation without a reduction in the rate of growth of the capital owned by the rest (which is not affected by changes in these parameters, as it depends only on s_R and i_0) increases k_R, which further reduces the rate of accumulation by increasing interest payments. Thus, increasing financialization in these senses reduces the rate of growth of the economy in the short run and further in the long run. In the short run there is no effect on income or wealth distribution. The long-run increase in k_R implies a fall in wealth inequality and, as can be seen from equation (15′), a fall in income inequality. The fall in wealth and income inequality occurs due to the fact that overall accumulation slows down without slowing down asset accumulation by the rest. Increasing financialization merely redistributes income within the top. If greater financialization also involves a reduction in i_0 when μ increases, accumulation by the rest will also slow down, and the effect on k_R can become negative.

It should be noted, however, that a reduction in the rate of capital accumulation and output growth also slows down employment growth, and if this increases the reserve army of the unemployed and reduces the power of workers, the result is a rise in π. As we can see from equation (15′), this can make the distribution of income more unequal. Of course the change in π

would have an effect on capital accumulation as well, as we will explore later.

Regarding top management, we examine the implications of increases in w_T and τ as well as increases in $\pi = 1 - w_R a$. Equation (19) shows that an increase in w_T or α reduces saving and investment, and therefore g. An increase in the payments to top managers reduces the surplus because firms have a higher propensity to save than those at the top. Thus the IS curve is pushed down. In the long run k_R rises, so that growth falls further, and asset and income distribution favors the rest. However, the indirect effect of these changes, working through an increase in π, is likely to increase g, pushing the IS curve upwards. This effect is more likely if τ is relatively small, given the relatively small size of this group. Equation (21) shows that the rise in π also shifts the $\dot{k}_R = 0$ donwards. Thus, in the short run, given k_R, g increases and, in the long run, k_R falls and g increases further, because the shift in the distribution of wealth towards the top increases overall saving and accumulation even further. The wealth distribution becomes more unequal, and income distribution becomes more vertically concentrated both due to the reduction in π and to the reduction in k_R.[10] Wage inequality increases when w_T increases, as α increases. As $\frac{w_T L_T}{w_R L_R} = \frac{w_T \tau}{(1-\pi)b}$, inequality in wage income also rises when w_T and/or τ increases and because of the resultant rise in π.

The overall effect on growth and income distribution depends on the relative changes in the parameters reflecting greater financialization and the role of top managers in the non-financial sector. The effect on growth may be positive or negative. It seems that top managers are likely to have a positive role in generating economic growth while financiers have a negative role. Regarding the distribution of income and wealth, an increase in the importance of top management in the economy (as reflected in higher numbers and higher income) increases inequality of income and wealth. However, increasing financialization can reduce inequality, though by slowing down economic growth it can also increase inequality.

4. A POST KEYNESIAN–KALECKIAN MODEL

The classical-Marxian model of the previous section assumed that saving and investment are equalized at the full capacity utilization as saving is always equal to investment. The post-Keynesian–Kaleckian (PKK) model

[10] The increase in τ need not necessary imply a rise in the share of the top (say, 1 per cent) because it may increase the number of top managers to go beyond the top 1 per cent, but if the increase does not extend the number of top managers beyond the top 1 per cent, the share of the top 1 per cent will increase.

departs from this assumption by introducing an independent investment function representing the investment plans of firms, and by allowing saving and investment to equalize—due to changes in output and capacity utilization—in response to excess supply or demand in the goods market. In equilibrium, saving and investment are equalized, so that equation (18) holds, but as an equilibrium condition rather than as an identity, as in the classical-Marxian model of the previous section. We first describe the assumptions of the model, then examine its short-run and long-run behavior and, finally, discuss the effects of parametric shifts affecting growth and distribution.

4.1 The model

First, we assume—as done in numerous PKK models that introduce lags in investment decisions—that in the short run g, the ratio of investment to capital stock, is given, determined by past decisions. Second, we assume that in the long run g changes according to the equation

$$\dot{g} = \Lambda\left[g^d - g\right] \tag{22}$$

The equation states that when the desired investment of firms deviates from actual investment, actual investment changes over time, moving towards the desired level. The speed of this adjustment is denoted by the constant Λ. The desired level of investment is assumed to be determined by the rate of capacity utilization (as in most PKK models) and by the internal savings or retained earnings of firms as a ratio of capital stock. The retained earnings effect shows how investment increases with the firms' retained earnings both because it represents a higher level of profitability and because it represents greater ease of financing due to the availability of internal finance which increases the willingness and ability to raise external finance (as argued by Kalecki, 1971). Both these factors are central to Steindl's (1952) formulation of investment behavior in his growth model (see also Dutt, 1995). We therefore assume

$$g^d = G\left(\frac{S_F}{K}, u\right) \tag{23}$$

where

$$S_F = \rho\Pi_F \tag{24}$$

and the partial derivatives of the function G, that is G_1 and G_2, are both positive. We can refer to the effect through G_1 as the retained earnings effect and the effect through G_2 as the direct capacity utilization or accelerator effect. In analyzing the investment behavior of firms in the long run we will have occasion to stress the roles of these two effects. Finally, as in the model of the previous section, k_R is fixed in the short run, but adjusts over time according to equation (16).

4.2 The short run

In the short run, given g and k_R, u adjusts to satisfy equation (18). This implies that in short run equilibrium, we have

$$u = \frac{g + w_T\tau \; s_F(1 - s_T) + [s_T - s_R + \rho(1 - s_T)(1 + \mu)]i_0 k_R}{s_R(1 - \pi) + (\rho + s_T(1 - \rho))\pi} \tag{25}$$

This short-run equilibrium level of u increases with both g and k_R, since the partial derivatives of u with respect to them, shown with subscripts with their symbols, are

$$u_g = \frac{1}{\Delta} \tag{26}$$

and

$$u_{k_R} = \frac{[s_T - s_R + \rho(1 - s_T)(1 + \mu)]i_0}{\Delta} \tag{27}$$

where $1/\Delta$ is the short-run investment multiplier and

$$\Delta = s_R(1 - \pi) + (\rho + s_T(1 - \rho))\pi$$

the weighted average of various saving rates. An increase in g increases the level of aggregate demand and therefore the level of output and capacity utilization through the multiplier effect. An increase in k_R shifts income from the top and the firms, which have a higher propensities to save to the rest, who have a lower propensity to save, increasing consumption and aggregate demand, thereby increasing output through the multiplier effect.

The short-run effects of changes in the other relevant parameters of the model can be shown as follows. We have, from equation (25),

$$u_\mu = \frac{\rho(1 - s_T)i_0 k_R}{\Delta} > 0, \quad u_\rho = -\frac{1 - s_T}{\Delta}[\pi u - w_T\tau - (1 + \mu)i_0 k_R] < 0$$

$$u_\tau = \frac{w_T \rho (1 - s_T)}{\Delta} > 0, \quad u_{w_T} = \frac{\tau \rho (1 - s_T)}{\Delta} > 0$$

$$u_\pi = -\frac{u}{\Delta}[\rho + s_T(1 - \rho) - s_R] < 0$$

An increase in financialization, as reflected by an increase in μ and a reduction in ρ, implies an increase in the rate of capacity utilization due to the increase in demand caused by a redistribution of income from firms to the top, who have a lower propensity to save.[11] An increase in the role of managers as reflected by an increase in w_T and τ directly implies an increase in capacity utilization, again by redistributing income from firms to the top, while the resultant rise in π reduces capacity utilization by reducing the income share of production workers who have the lowest propensity to save. The total effect is indeterminate in general, depending on the extent by which the increase in the role of managers increases π.[12] It may be noted that if firms do not have any retained earnings at all, u_μ, u_τ and u_{w_T} become zero, and u_ρ becomes irrelevant. However, $u_\pi = -\frac{u}{\Delta}[s_T - s_R] < 0$ is still satisfied. It is the redistribution between firms and the top that brings about the effects changes in the other variables. All the effects occur because of effects on consumption alone, with investment assumed to be given.

4.3 The long run

In the long run, the dynamics of g and k_R are found by substituting equations (2) through (5), (7), (8), (10), (23) and (24) into equation (22), which implies

$$\dot{g} = \Lambda[G(\rho[\pi u - w_T \tau - i_0(1 + \mu)k_R], \; u) - g] \tag{28}$$

and equation (16), which can be rewritten as

$$\dot{k}_R = s_R(1 - \pi)u - (g - s_R i_0)k_R \tag{16'}$$

[11] The requirement that positive net profits after interest and other payments—as shown in equation (10)—is positive implies that the term within square brackets in the expression for u_ρ is positive, to ensure that $u_\rho<0$.
[12] Even if we assume that there is an increase in net profits we cannot conclude that aggregate demand will fall, since there is also a positive effect on aggregate demand due to an increase in consumption caused by the redistribution of income from the firms to the top.

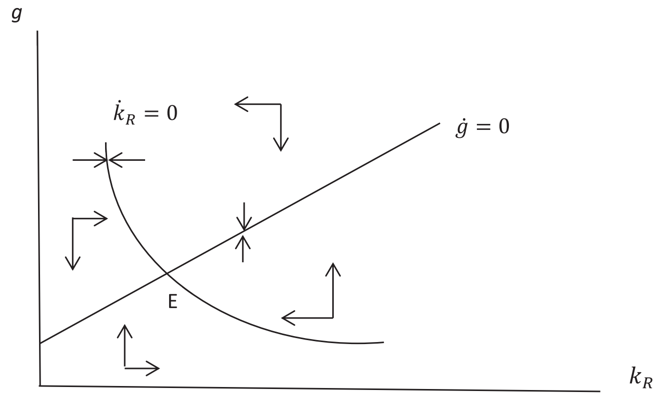

Figure 2. Post-Keynesian–Kaleckian model with positively sloped $\dot{g}=0$ curve.

where u is given by equation (25). Figures 2 and 3 show the dynamics of g and k_R for this model.

The $\dot{g} = 0$ curve shows combinations of g and k_R at which g is stationary. Equation (28) implies that a change in g changes $\dot{g}$ according to

$$\frac{\partial \dot{g}}{\partial g} = \Lambda\left[(G_1 \rho \pi + G_2) u_g - 1\right]$$

We assume that G_1 and G_2, while positive, are small enough to make this expression negative. This happens if $(G_1 \rho \pi + G_2) u_g < 1$ or, using equation (26), if

$$s_R(1 - \pi) + (\rho + s_T(1 - \rho))\pi > G_1 \rho \pi + G_2 \tag{29}$$

This is the standard macroeconomic stability condition that requires that the responsiveness of saving to the relevant adjusting variable (in this case, u), which is shown by the left-hand side of the inequality, exceeds the responsiveness of investment, shown by the right-hand side.[13] If this condition is satisfied, starting from a stationary level of g, an increase in g will make $\dot{g}$ negative.

Equation (28) also implies, using equation (27),

[13] The standard stability condition normally refers to short-run stability, given the short-run parameters. In our model, short run stability is automatically satisfied since investment does not respond to changes in u, and since $\Delta > 1$, so that saving responds positively to changes in u. Here we are discussing long-run stability. In some models stability in the goods market is not assumed to hold, most famously in the Harrod (1939) model, and some models assume short-run stability but not long-run stability in the goods market.

$$\frac{\partial \dot{g}}{\partial k_R} = \Lambda i_0\left[(G_1\rho\pi + G_2)u_g[\rho + (1-\rho)s_T - s_R + \rho(1-s_T)\mu] - G_1(1+\mu)\right]$$

This expression can be positive or negative. Since we have assumed that condition (29) is satisfied, we have $(G_1\rho\pi + G_2)u_g < 1$. While this tends to make the first term in square brackets smaller than $[\rho + (1-\rho)s_T - s_R + \rho(1-s_T)\mu]$ and therefore contributes to making the expression smaller and hence more likely to be negative, it is not sufficient to ensure that it is negative as, with a very low level of G_1, approaching zero, the expression is positive. Thus, an increase in k_R may increase or reduce the desired accumulation rate and hence $\dot{g}$. Using the expression for u_g, this expression can be rewritten as

$$\begin{aligned}\frac{\partial \dot{g}}{\partial k_R} = \frac{\Lambda i_0}{\Delta}\{ &- G_1[(1-\rho)(s_T - s_R)\pi + (1+\mu)(\rho(1-\rho)(1-s_T)\pi - s_R) \\ &+ \mu(s_T\pi + s_R(1-\pi))] + G_2[\rho + (1-\rho)s_T - s_R + \rho(1-s_T)\mu]\}\end{aligned}$$

An increase in g^d hence $\dot{g}$ is more likely if the increase in k_R increases capacity utilization (as we found it does in the short run) and hence investment more because of its accelerator or direct capacity utilization effect through the term involving G_2 than it reduces investment through the retained earnings effect brought about by the increase in firm borrowing. In what follows we will examine both cases.

In the case in which $\frac{\partial \dot{g}}{\partial k_R} > 0$, starting from a position on the $\dot{g} = 0$ line, an increase in k_R increases $\dot{g}$, making $\dot{g} > 0$. To make $\dot{g}$ return to zero we need to increase g, since $\frac{\partial \dot{g}}{\partial g} < 0$. Thus, the $\dot{g} = 0$ line is positively sloped, as shown in figure 2. In the case in which $\frac{\partial \dot{g}}{\partial k_R} < 0$ analogous reasoning shows that the $\dot{g} = 0$ line is negatively sloped, as shown in figure 3. As, in both cases $\frac{\partial \dot{g}}{\partial g} < 0$, $\dot{g} < 0$ at points above the $\dot{g} = 0$ line and $\dot{g} > 0$ at points below it, explaining the direction of the vertical arrows in both figures 2 and 3.

The $\dot{k}_R = 0$ curve shows combinations of g and k_R at which k_R is stationary. It is obtained from equations (16′) and (25) obtained by setting the left hand side of equation (16′) to zero. The equation of the curve is given by

$$g = s_R i_0 + \frac{s_R(1-\pi)u}{k_R} \tag{30}$$

where u is given by equation (25). The curve for this equation is marked $\dot{k}_R = 0$ in figures 2 and 3 and shown only for the positive quadrant.

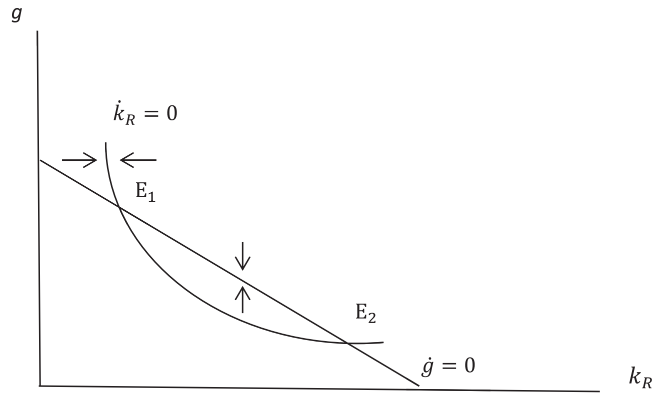

Figure 3. Post-Keynesian–Kaleckian model with negatively sloped $\dot{g}=0$ curve.

Equation (16′) implies that a change in k_R changes $\dot{k}_R$ according to

$$\frac{\partial \dot{k}_R}{\partial k_R} = s_R(1-\pi)u_{k_R} - (g - s_R i_0) \tag{31}$$

Substituting from equations (27), and (30), since we are evaluating this for when the economy is near the $\dot{k}_R = 0$ curve, we obtain

$$\frac{\partial \dot{k}_R}{\partial k_R} = -\frac{s_R(1-\pi)[g + w_T\tau\rho(1-s_T)]}{\Delta k_R} < 0 \tag{31′}$$

Thus, an increase in k_R reduces $\dot{k}_R$ in the neighborhood of the $\dot{k}_R = 0$ curve.[14] The increase in k_R increases output and capacity utilization by increasing aggregate demand, and therefore increases the labor income of the rest as well as their capital income, but with g sufficiently high, it is not enough to increase the share of capital of the rest in total capital since total capital accumulation also rises with the increase in capacity utilization. Also, equation (16′) implies that

$$\frac{\partial \dot{k}_R}{\partial g} = s_R(1-\pi)u_g - k_R \tag{32}$$

Substituting from equations (26) and (30) as before, we obtain

[14] If g increases the negative sign of this expression will remain, as seen from equation (31). However, when g is reduced sufficiently, the expression can turn negative. The result is strictly valid in the neighborhood of the $\dot{k}_R = 0$ line.

$$\frac{\partial \dot{k}_R}{\partial g} = -\frac{s_R(1-\pi)}{\Delta(g - s_R i_0)}[s_R i_0 + w_T \tau \rho (1-s_T) + [s_T - s_R + \rho(1-s_T)(1+\mu)] i_0 k_R] < 0. \tag{32'}$$

Thus, an increase in g reduces $\dot{k}_R$ in the neighborhood of the $\dot{k}_R = 0$ curve.[15] An increase in g increases output and capacity utilization by increasing aggregate demand, but given our assumptions which imply a sufficiently high level of g, the increase in overall capital accumulation exceeds the increase in the capital owned by the rest, so that the share of capital owned by the rest falls.

It follows that the $\dot{k}_R = 0$ curve has a negative slope given by

$$\frac{dg}{dk_R} = -\frac{[g + w_T \tau \rho(1 - s_T)](g - s_R i_0)}{[s_R i_0 + w_T \tau \rho(1 - s_T) + [s_T - s_R + \rho(1 - s_T)(1 + \mu) i_0 k_R]] k_R} \tag{33}$$

which is negative if $g > s_R i_0$. Starting from a position on the curve, an increase in k_R reduces $\dot{k}_R$, which must be compensated by a reduction in g to increase $\dot{k}_R$ to make it return to $\dot{k}_R = 0$. The negatively sloped $\dot{k}_R = 0$ curve is shown in figures 2 and 3, where we confine attention to levels of $g > s_R i_0$. Since, from equation (31′), $\frac{\partial \dot{k}_R}{\partial k_R} < 0$ in the neighborhood of the curve, $\dot{k}_R$ rises (falls) below (above) the line, the direction of the horizontal arrows is as shown in the figures. Inspection of equation (33) shows that the (absolute) value of the slope of the line increases when g increases and decreases when k_R increases, given the negative slope of the line, the curve is concave from below, as drawn in the figures.

Long-run equilibria, with stationary levels of g and k_R, occurs at the intersection of the $\dot{g} = 0$ and $\dot{k}_R = 0$ curves. In the case of the upward-rising $\dot{g} = 0$ shown in figure 2, we have a single long-run equilibrium, at E. The (local) stability of long-run equilibria depends on the trace and determinant of the Jacobian matrix of the dynamic system given by

$$\mathbf{\Omega} = \begin{bmatrix} \frac{\partial \dot{g}}{\partial g} & \frac{\partial \dot{g}}{\partial k_R} \\ \frac{\partial \dot{k}_R}{\partial g} & \frac{\partial \dot{k}_R}{\partial k_R} \end{bmatrix}$$

As all the elements of this matrix are negative except for $\frac{\partial \dot{g}}{\partial k_R}$, which is positive, its trace is negative and its determinant is positive, the long-run equilibrium is locally stable. In the case of the negatively sloped $\dot{g} = 0$, as shown in figure 3,

[15] This holds for any value of $g > s_R i_0$.

there may be two long-run equilibria. As, in this case all the elements of the Jacobian are negative, although the trace is negative, the determinant may be positive or negative. The long-run equilibrium at E_1 is stable, as can be verified from figure 3 and by noting that the determinant is positive, while that at E_2 is a saddle-point. Thus, for the negatively-sloped $\dot{g} = 0$ curve, the long-run dynamics of this model is similar to that of the classical-Marxian model.

This model implies that in long-run equilibrium, g and k_R are endogenous. Equation (25) thus implies that in long-run equilibrium u is also endogenous, and does not have to be equal to some exogenously-given level of desired or normal rate of capacity utilization. The plausibility of this result has been questioned by several critics (see Hein, 2014, for a recent review of the debates). To sidestep these criticisms and debates, this model can be interpreted as a medium-run model rather than a truly long-run one (however these terms are interpreted).

4.4 Effects of parametric changes

The long-run effects of parametric changes can be shown by totally differentiating equations (28) and (16), which imply

$$\mathbf{\Omega}\begin{bmatrix} dg \\ dk_R \end{bmatrix} = -\begin{bmatrix} \Lambda\left[G_1\pi u + (G_1\pi\rho + G_2)u_\rho\right] \\ s_R(1-\pi)u_\rho \end{bmatrix} d\rho - \begin{bmatrix} \Lambda[(G_1\pi\rho + G_2)u_\mu - G_1 i_0 k_R] \\ s_R(1-\pi)u_\mu \end{bmatrix} d\mu$$

$$-\begin{bmatrix} \Lambda[(G_1\pi\rho + G_2)u_{w_T} - \tau G_1] \\ s_R(1-\pi)u_{w_T} \end{bmatrix} dw_T - \begin{bmatrix} \Lambda[(G_1\pi\rho + G_2)u_\tau - w_T G_1] \\ s_R(1-\pi)u_\tau \end{bmatrix} d\tau$$

$$-\begin{bmatrix} \Lambda[(G_1\pi\rho + G_2)u_\pi + \rho u] \\ s_R[(1-\pi)u_\pi - u] \end{bmatrix} d\pi \qquad (34)$$

Using equations (25), (26) and the other expressions showing the short-run effects of changes in the relevant parameters on u, and evaluating the results starting from a stable long-run equilibrium (at E or at E_1 in figures 2 and 3) we can obtain the following results for this model.

For the analysis of the effects of changes in parameters it is convenient to begin with the effects of a change in π, the share of gross profits in income from production, because changes in other parameters and variables are likely to bring about changes in this parameter as well. We saw earlier that the short-run effect of a change π, shown by u_π is negative, since the increase in π redistributes income from production workers to other income recipients, who have a lower propensity to consume, therefore reducing consumption demand, given the level of investment in the short run. The long-run equilibrium effects on g and k_R are given by

$$\frac{dg}{d\pi} = \frac{1}{\boldsymbol{\Omega}}\left\{ -\Lambda[(G_1\pi\rho + G_2)u_\pi + \rho u]\frac{\partial \dot{k}_R}{\partial k_R} + s_R[(1-\pi)u_\pi - u]\frac{\partial \dot{g}}{\partial k_R}\right\} \quad (35)$$

and

$$\frac{dk_R}{d\pi} = \frac{1}{\boldsymbol{\Omega}}\left\{ -s_R[(1-\pi)u_\pi - u]\frac{\partial \dot{g}}{\partial g} + \Lambda[(G_1\pi\rho + G_2)u_\pi + \rho u]\frac{\partial \dot{k}_R}{\partial g}\right\} \quad (36)$$

The signs of these derivatives depend on the value of $(G_1\pi\rho + G_2)u_\pi + \rho u$. We have, using the expression for u_π,

$$(G_1\pi\rho + G_2)u_\pi + \rho u = \frac{u}{\Delta}[G_1\rho s_R - G_2(\rho + s_T(1-\rho) - s_R)]$$

This expression can be positive if the retained earnings effect dominates (for instance, if $G_2$is very small in relation to G_1) or negative if the direct capacity utilization dominates (for instance, if G_1, s_R or ρ are very small). The expression captures the effect of a change in π on desired investment, g^d for given values of g and k_R and all other parameters. An increase in π reduces capacity utilization by redistributing income to the top, whose members have a higher propensity to save, thereby reducing aggregate consumption demand, which also reduces investment through the direct capacity utilization effect. The fall in capacity utilization also reduces gross profits and hence retained earnings. The effect of all this is to reduce desired investment both through the direct capacity utilization effect and its effect on retained earnings (that is, the indirect capacity utilization effect). However, the change in the profit share also has a positive effect on retained earnings, which increases desired investment. The overall effect is ambiguous.[16] As desired investment can rise of fall with the profit share, we can have wage-led or profit-led growth in a commonly used sense of the term.[17]

[16] Such an ambiguous effect is also found in the Steindlian model with internal finance developed in Dutt (1995).

[17] Whether growth is wage led or profit led does not depend on the investment function depending on the profit share and the rate of capacity utilization, as in Bhaduri and Marglin (1990). Here, investment depends on the internal saving of firms and on capacity utilization. It should be noted that the effect is for given values of g and k_R. As we shall see later, the total long-run equilibrium effect of a change in π on g may also be ambiguous in this model. Thus the model can be wage- or profit-led even in the long-run equilibrium sense.

If we assume that the expression is negative, so that desired investment falls with a rise in π because the capacity utilization effect dominates, the first term within the curly brackets in equation (35) is negative, and the second term is negative since $(1-\pi)u_\pi - u < 0$ if $\frac{\partial \dot{g}}{\partial k_R} > 0$, so that the effect of a rise in π on long-run equilibrium g is necessarily negative. If $\frac{\partial \dot{g}}{\partial k_R} < 0$, the effect is ambiguous, also a small value of s_R is likely to make it negative as well. Equation (36) shows that the effect on k_R is ambiguous, since the first term within curly brackets in the equation is negative, which the second term is positive. The effect on the long-run equilibrium value of k_R is ambiguous because, on the one hand, the increase in the profit share, π, squeezes the income of the rest and therefore reduces their saving and their capital accumulation while, on the other hand, it also reduces overall accumulation by reducing aggregate demand, thereby increasing the capital share of the rest. If $(G_1\pi\rho + G_2)u_\pi + \rho u > 0$, the first term within curly brackets in equation (35) becomes positive, and the second term can be negative or positive, so that the effect on g is ambiguous. In this case equation (36) shows that k_R necessarily falls when π increases, both because of the fact that the accumulation by the rest falls and because total accumulation increases.

The effect of a rise in π can also be examined graphically using figures 2 and 3. If $(G_1\pi\rho + G_2)u_\pi + \rho u < 0$, then for a given g and k_R, g^d falls, implying that $\dot{g} < 0$, so that g must be reduced to bring $\dot{g}$ back to zero. Thus the $\dot{g} = 0$ curve in both figures shifts down. As the rise in π directly reduces accumulation by the rest and the induced reduction in u has the same effect, for given g and k_R, $\dot{k}_R$ becomes negative. To restore $\dot{k}_R$ to zero, g has to be reduced, implying that the $\dot{k}_R = 0$ shifts downwards. The negative effect on g and the ambiguous effect on k_R are verified for figure 2, since this case corresponds to the case in which $\frac{\partial \dot{g}}{\partial k_R} > 0$, while the ambiguous effects on both g and k_R are also verified for figure 3, which corresponds to the case in which $\frac{\partial \dot{g}}{\partial k_R} < 0$. In the latter case, if s_R is small, the shift in the $\dot{k}_R = 0$ will be small and the effect of the shift in the $\dot{g} = 0$ curve will dominate, making the reduction in g and increase in k_R more likely. For the case in which $(G_1\pi\rho + G_2)u_\pi + \rho u > 0$, $\dot{g} = 0$ curve in both figures shifts upwards while the $\dot{k}_R = 0$ shifts downward as before. The effects on g and k_R are confirmed.

The overall effect on growth and distribution may be summarized as follows. When π increases it is very likely that economic growth falls, although an increase cannot be ruled out if the retained earning effect is strong, which is unlikely for a low value of s_R. The distribution of wealth, measured by k_R, can go in either direction. The distribution of income is made more unequal by the rise in π, is made more equal if k_R rises and if u falls, which are clearly all possible. To the extent that lower income groups own a small amount of assets, it is likely that the overall effect is greater inequality, although the possibility that the share of income for the top may fall cannot be ruled out. There is obviously no change in the relative wage, although the distribution of labor income will be more unequal if u falls.

Turning now to financialization, the effects of a change in the retained earnings rate, ρ, on the long-run equilibrium value of g and k_R is found to be

$$\frac{dg}{d\rho} = \frac{1}{\mathbf{\Omega}}\left\{ -\Lambda\left[G_1\pi u + (G_1\pi\rho + G_2)u_\rho\right]\frac{\partial \dot{k}_R}{\partial k_R} + s_R(1-\pi)u_\rho\frac{\partial \dot{g}}{\partial k_R}\right\} \tag{37}$$

and

$$\frac{dk_R}{d\rho} = \frac{1}{\mathbf{\Omega}}\left\{ -s_R(1-\pi)u_\rho\frac{\partial \dot{g}}{\partial g} + \Lambda\left[G_1\pi u + (G_1\pi\rho + G_2)u_\rho\right]\frac{\partial \dot{k}_R}{\partial g}\right\} \tag{38}$$

The sign of these expressions is affected by the sign of the effect of the retained earnings rate on desired investment, given by

$$\left[G_1\pi u + (G_1\pi\rho + G_2)u_\rho\right] = G_1\frac{\pi}{\Delta}\{[s_R(1-\pi) + s_T\pi]u + (1-s_T)\rho[w_T\tau + (1+\mu)i_0k_R]\}$$

$$-\,G_2\frac{1-s_T}{\Delta}[\pi u - w_T\tau - (1+\mu)i_0k_R]$$

which can be positive or negative. We saw earlier, in our analysis of the short run, that $u_\rho<0$. Moreover, positive net profit, which is a reasonable requirement for positive growth and long-run equilibrium, we have $\pi u - w_T\tau - (1+\mu)i_0k_R > 0$. It follows that the increase in the retained earnings rate ρ has a positive effect on investment by increasing the savings of firms for a given rate of capacity utilization, but a negative effect both by reducing the profit flow by reducing capacity utilization and through the direct effect of the reduction in capacity utilization on investment. The expression shows us that the total effect through G_1, that is, the retained earnings effect, is positive, while that through G_2, the capacity utilization or accelerator effect, is negative. If the former effect is large relative to the latter effect, the expression is positive.

Although the signs of $\frac{\partial \dot{g}}{\partial k_R}$ and $\left[G_1\pi u + (G_1\pi\rho + G_2)u_\rho\right]$ are not determined by the same condition (for instance, the sign of $\frac{\partial \dot{g}}{\partial k_R}$ is independent of the values of k_R, w_T and τ, while that of $\left[G_1\pi u + (G_1\pi\rho + G_2)u_\rho\right]$ depends on them), a stronger retained earnings effect is more likely to result in $\frac{\partial \dot{g}}{\partial k_R} < 0$ and more likely to imply that $\left[G_1\pi u + (G_1\pi\rho + G_2)u_\rho\right] > 0$, and conversely when there is a stronger accelerator or capacity utilization effect. Since we will concentrate on the strength of these two effects in what follows, to avoid the proliferation of the number of possible cases, we will examine the cases of a strong retained earnings and accelerator or capacity utilization effects which satisfies both the inequalities simultaneously.

In the case of the strong capacity utilization or accelerator effect, when $\frac{\partial \dot{g}}{\partial k_R} > 0$, the case shown in figure 2 holds. For this case $[G_1\pi u + (G_1\pi\rho + G_2)u_\rho] < 0$ is more likely. Since we have, at long-run equilibrium, $\frac{\partial \dot{k}_R}{\partial k_R} < 0$, $\frac{\partial \dot{k}_R}{\partial g} < 0$ and $\frac{\partial \dot{k}_R}{\partial k_R} < 0$, with the stronger capacity utilization or accelerator effect equations (37) and (38) show that $\frac{dg}{d\rho} < 0$ and $\frac{dk_R}{d\rho}$ cannot be definitely signed. Graphically, with the strong capacity utilization effect the rise in ρ and the resultant fall in u reduces desired investment, so that $\dot{g}$ falls. Therefore, g must be reduced to restore $\dot{g} = 0$, implying that the $\dot{g} = 0$ curve shifts down. Since the increase in ρ reduces u, we see from equation (30) that g must fall to satisfy $\dot{k}_R = 0$, so that the $\dot{k}_R = 0$ curve must shift downwards. The rise in the retained earnings rate reduces u and slows down the rate of capital accumulation by the rest, which reduces $\dot{k}_R$, so that the overall rate of capital accumulation, g must be reduced to restore $\dot{k}_R = 0$. The negative effect on g and the ambiguous effect on k_R is confirmed. If the rest save a small portion of their income, and s_R is small, however, the shift in the $\dot{k}_R = 0$ curve will be small, and this case, as the expression for $\frac{dk_R}{d\rho}$ confirms, the effect on k_R is positive. While the effect on k_R tends to make the distribution of income more equal, if the reduction in the growth rate increases π, the distribution of income is more likely to worsen.

If the retained earnings effect is stronger, and we have $\frac{\partial \dot{g}}{\partial k_R} < 0$ and $\left[G_1\pi u + (G_1\pi\rho + G_2)u_\rho\right] > 0$, and the case is as depicted in figure 3, equations (37) and (38) show that $\frac{dg}{d\rho} > 0$ and $\frac{dk_R}{d\rho} < 0$. Thus, a rise in the rate of retained earnings reduces the share of the rest in capital stock, and increases the rate of growth of the economy because of the positive effect of retained earnings on investment. Graphically, while the effect on the $\dot{k}_R = 0$ is the same as before, that is, it shifts down, $\dot{g} = 0$ curve shifts up. The increase in ρ increases desired investment, and therefore increases $\dot{g}$ so that, to maintain $\dot{g} = 0$ we need to increase g. The downward shift in the $\dot{k}_R = 0$ curve and the upward shift in the negatively-sloped $\dot{g} = 0$ implies, as can be seen from figure 3, a long-run equilibrium rise in g and fall in k_R.

An effect of a change in μ can be examined from the expressions

$$\frac{dg}{d\mu} = \frac{1}{\mathbf{\Omega}}\left\{ -\Lambda\left[(G_1\pi\rho + G_2)u_\mu - G_1 i_0 k_R\right]\frac{\partial \dot{k}_R}{\partial k_R} + s_R(1-\pi)u_\mu \frac{\partial \dot{g}}{\partial k_R}\right\} \quad (39)$$

and

$$\frac{dk_R}{d\mu} = \frac{1}{\mathbf{\Omega}}\left\{ -s_R(1-\pi)u_\mu \frac{\partial \dot{g}}{\partial g} + \Lambda\left[(G_1\pi\rho + G_2)u_\mu - G_1 i_0 k_R\right]\frac{\partial \dot{k}_R}{\partial g}\right\} \quad (40)$$

The sign of these expressions is seen to depend on the sign of

$$\left[(G_1\pi\rho + G_2)u_\mu - G_1 i_0 k_R\right]$$
$$= \frac{i_0 k_R}{\Delta}\{-G_1[s_T\pi + s_R(1-\pi) + \rho(1-\rho)(1-s_T)\pi] + G_2\rho(1-s_T)\}$$

This expression is more likely to be negative the larger is G_1 or a stronger is the retained earnings effect and the smaller is G_2 or weaker is the accelerator or capacity utilization effect and the smaller is ρ. When the capacity utilization effect dominates, and this expression and $\frac{\partial \dot{g}}{\partial k_R}$ are positive, as $u_\mu > 0$, $\frac{dg}{d\mu} > 0$ and $\frac{dg}{d\mu}$ cannot be signed. Graphically, since the increase in μ increases u and g^d, both the $\dot{g} = 0$ and $\dot{k}_R = 0$ are pushed up in figure 2, confirming that the effect on the long-run equilibrium level of g is positive, and the effect on k_R ambiguous. The effect of the rise in μ is to reduce saving by firms, thereby increasing consumption demand, capacity utilization and investment, which is stronger than the negative effect through the interest rate channel. If s_R is small, the effect on k_R is more likely to be positive. When the retained earnings effect dominates—which, as the expression for $\left[(G_1\pi\rho + G_2)u_\mu - G_1 i_0 k_R\right]$ shows is more likely when ρ is smaller—this expression and $\frac{\partial \dot{g}}{\partial k_R}$ are negative, the sign patterns imply that $\frac{dg}{d\mu} < 0$ and $\frac{dk_R}{d\mu} > 0$. Graphically, the $\dot{g} = 0$ moves down because g^d falls and the $\dot{k}_R = 0$ moves up, resulting in a fall in g and a rise in k_R, confirming the changes noted earlier. The strong retained earning effect reduces the rate of growth by reducing desired investment, despite the short-run increase in u, and by increasing capacity utilization in the short run and speeding up asset accumulation by the rest, and also by reducing overall accumulation, increases the share of capital owned by the rest. The effect on inequality may thus be positive, although if there is a negative growth effect, the resultant rise in π is more likely to worsen income distribution.

It is possible that the higher interest costs are passed on by firms to an increase in markup and therefore reduces the share of the wages of the rest (see, for instance, Dutt, 1992), the change in the share of the wages of the rest reduces aggregate demand, output and capacity utilization by reducing consumption demand by shifting the distribution of income from those with a higher propensity to save. Thus, the growth-reducing effect (if the accelerator term is stronger) and the inequalizing effect of financialization is likely to be stronger.

The effects of a rise in w_T on the long-run equilibrium values of g and k_R are given by

$$\frac{dg}{dw_T} = \frac{1}{\mathbf{\Omega}}\left\{ - \Lambda[(G_1\pi\rho + G_2)u_{w_T} - \tau G_1]\frac{\partial \dot{k}_R}{\partial k_R} + s_R(1-\pi)u_{w_T}\frac{\partial \dot{g}}{\partial k_R}\right\} \quad (41)$$

and

$$\frac{dk_R}{dw_T} = \frac{1}{\mathbf{\Omega}}\left\{ - s_R(1-\pi)u_{w_T}\frac{\partial \dot{g}}{\partial g} + \Lambda[(G_1\pi\rho + G_2)u_{w_T} - \tau G_1]\frac{\partial \dot{k}_R}{\partial g}\right\} \quad (42)$$

The signs of these expressions are influenced by the sign of

$$(G_1\pi\rho + G_2)u_{w_T} - \tau G_1 = \frac{\tau}{\Delta}\{ - G_1(s_R(1-\pi) + s_T(1-\rho)\pi) + G_2\rho(1 - s_T\}$$

which can be negative or positive. The first term within curly brackets is negative, representing the negative retained earnings effect, while the second term is positive, representing the positive accelerator or direct capacity utilization effect. If the former effect dominates, the expression is negative. In this case, from equation (41) we see that $\frac{dg}{dw_T} < 0$ if $\frac{\partial \dot{g}}{\partial k_R} < 0$, and is ambiguous is sign if $\frac{\partial \dot{g}}{\partial k_R} > 0$, and equation (42) implies that $\frac{dk_R}{dw_T} > 0$. If the latter effect dominates, the expression is positive. In this case, from equation (41) we see that $\frac{dg}{dw_T} > 0$ if $\frac{\partial \dot{g}}{\partial k_R} > 0$ and it is ambiguous in sign if $\frac{\partial \dot{g}}{\partial k_R} < 0$. Also, from equation (42) we find that the sign of $\frac{dk_R}{dw_T}$ is ambiguous. If the retained earning effect is stronger, it is more likely that growth is reduced with lower profits and this increases k_R, while if the accelerator effect is stronger, growth is more likely to increase and it is possible for k_R to fall as total accumulation can increase faster than accumulation by the rest. Since the increase in w_T also increases π, if the retained earnings effect in this case is weak because of a relatively low s_R, the effect of this is to reduce growth and very likely increase income inequality. The total effect is also likely to be the same.

The effect of an increase in τ is very similar, since equation (34) and the short run effects on u are symmetrical, making it unnecessary to repeat the analysis.

5. CONCLUSION

This paper has developed a simple model with two groups of people, the top and the rest, to examine the implications of the kinds of changes that have been argued to increase the share of the income at the top. It has shown that financialization and the increasing importance and income of top managers (or CEOs and their allies and close subordinates) can explain both lower rates of growth, and rising wealth and income inequality especially with deficient aggregate demand.[18] Although in many cases the effects are ambiguous, we have examined mechanisms that bring about these results and conditions under which they are more likely to occur. For instance, a stronger capacity utilization effect on investment as compared with the retained earning effect, and a low saving rate and consequently low wealth share of the rest are more likely to bring about these results. Building on the literatures on financialization and managerial capitalism, but combining them, we have tried to understand how increases in inequality that are a joint result of these changes affect the economy. Building on the contributions of Pasinetti and others on savings and capital accumulation by two classes we have focused on the implications of changes in the distribution of wealth between the classes and how these changes interact with changes in income distribution.[19]

The model we have developed is a simple one with many important omissions. First, we have examined two separate models. The analysis can be extended to deal with a combined model in which we can allow for post-Keynesian–Kaleckian features at lower levels of aggregate demand when accumulation is demand-constrained and classical-Marxian features at higher levels of aggregate demand, when accumulation is saving constrained to endogenously determine under what conditions aggregate demand deficiency is more likely. Second, we have abstracted from many

[18] If growth is determined by capital accumulation due to saving and not by the effect of aggregate demand on investment, we saw that increases in the role of managers is more likely to increase, rather than reduce growth.

[19] It is beyond the scope of this paper, given that it is already quite lengthy, to systematically compare the assumptions and implications of the models of this paper to those of the related contributions on financialization, managerial capitalism and Pasinetti-type models mentioned in the introduction. Some examples may be briefly mentioned. The differences in implications follow from the many differences in assumptions, such as those allowing for different rates of return on capital owned by different groups and the existence of wage income for the top (as compared to the basic Pasinetti framework), and the specific form of wage income of capitalists—as a subtraction from the 'surplus' or profits of firms after the payment to production workers—in contrast to the treatment in Palley (2014) where the 'surplus' received by firms is found after the payment of wages for both production workers and managers.

important financial issues. We have assumed that only the rest receive interest payments and lend, thereby abstracting from the fact that the top holds not only equity but are also lenders. We have also abstracted from changes in the price of stocks and bonds. Moreover, we have concentrated only on borrowing by firms. We can extend the model to introduce borrowing and debt holding by some lower-income borrowers which, along the lines discussed in Dutt (2006), can imply further adverse distributional consequences on growth in the long run, which may be hidden in the short run. Third, we have abstracted from fiscal policy considerations. Introducing fiscal policy changes, for instance, reductions in the taxes on the top income recipients and increases for the rest can not only be used to provide additional incentives for the people at the top increasing their efforts to garner a higher share of income (as discussed by Alvaredo *et al.*, 2013) but also explain how, by shifting income distribution and reducing consumer spending, growth is reduced due to a reduction in aggregate demand. Finally, we have examined a closed economy. Introducing open economy and globalization can provide us with additional reasons for increases in the share of capital income which is mobile across borders and which reduces the bargaining power of workers, although the effects on growth become more complicated because of the effects on technological change and international competitiveness, and require the analysis of more than one country.

The model also raises important issues for the relative power of different groups in society, which are left for future work. It has been argued that, with the rise in importance of high-skill labor and the growth of footloose and short-term labor, the power of labor has declined, and with the increasing role of workers as asset holders (especially through pension capital) they are no longer interested only in increasing the share of labor income. Moreover, it has been argued that ethnic and gender divisions may also have had a role in weakening the power of the labor. It has also been argued that the rich are also divided in terms of their roles of financiers, industrial capitalists and managers. However, these divisions may have been exaggerated to the extent that many of the same people may be both managers, financial and industrial capitalists (and indeed, industrial firms have also become financial investors), reminiscent of—though not the same as—Hilferding's (1910) analysis of finance capital—and hence have shared interests and group cohesion. Our analysis in terms of two vertical groups that do not strictly follow functional divisions can be used to understand whether class interests based on functional categories can be replaced by group interests based on vertical inequality and whether this inequality can come to resemble aspects of horizontal inequality. Horizontal groupings in terms of shared identities and solidarity between different subgroups may emerge, based on shared interests and shared views of what is a good society, facilitated perhaps by the increasing spread of the internet and other forms of social media that builds virtual communities (despite the superior knowledge power of the top). Whether such changes will tilt the balance of power in the political arena from the top to the rest remains to be seen.

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