Demand, Production, and the Determinants of Distribution: A Caveat on "Wage-Led Growth"

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Extended Abstract

Wages and profits pertain to different moments of accumulation. Wages are shares of capital outlays sustaining production; profits are shares of sales. In any setting where production and consumption commitments are determined with degrees of mutual autonomy, the neo-Kaleckian "paradox of cost" has no analytical purchase. First, for any given real wage and labour-output ratio, the distribution of income is shaped by the relative measure of production and consumption undertakings. Second, distribution and output are jointly *determined, ensuring their associations are confounded, not causal. And third, the role of consumption propensities in conditioning the association between output and the real wage is fundamentally different from that required for "wage-led growth". To establish these results, this paper develops analytical foundations for comparative-static and dynamic approaches to the relationship between demand, output, and the functional or class distribution of income, based on the Circuit of Capital. It also develops a new taxonomy concerning growth and distribution, centered on the distinction between "investment-led" and "consumption-led" growth, with the former supporting the high-growth, rising-wage-share evolutions sought by proponents of "wage-led growth".*

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[1] The discussion offered in this paper arose from an ongoing conversation with Duncan Foley concerning the Circuit of Capital and its distinctive macroeconomic purchase, and draws on work leading to Foley (2013). The paper has also directly benefitted from comments provided by Peter Skott and Jo Michell. The usual disclaimers apply.

> Now are the wages of the weaver a share of the cloth, of the twenty dollars, of the product of his work? By no means. Long before the cloth is sold, perhaps long before it is fully woven, the weaver has received his wages. The capitalist, then, does not pay his wages out of the money which he will obtain from the cloth, but out of money already on hand.... It is possible that the employer found no purchasers at all for his cloth. It is possible that he did not get even the amount of the wages by its sale. It is possible that he sells it very profitably in proportion to the weaver's wages. But all that does not concern the weaver.... Wages, therefore, are not a share of the worker in the commodities produced by himself.
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> --K Marx, *Wage-Labour and Capital*, Chapter 2.

1. Introduction

The concept of "wage-led growth" has gained currency among heterodox economists in recent years. Put most simply, it consists of the contention that higher consumption propensities by wage earners may ensure that higher wage shares in total income result in net increases in aggregate demand and in higher equilibrium levels of output. The growing popularity of the concept is perhaps not surprising, as it supports positive, "common-sense" arguments in favour of measures seeking to reverse significant trends towards greater levels of income inequality and lower real wages evident across a range of economies over the past thirty years.

The fundamental idea behind "wage-led growth" is not new.[2] But its contemporary expressions are analytically supported and motivated by modern *under-consumptionist* contributions. Plurally understood, under-consumptionism refers to a wide range of appreciations of the centrality of aggregate demand in shaping the accumulation of capital. Most generally, it follows from the recognition of the relative autonomy under capitalist conditions of decisions to purchase commodities from the decisions to produce them. Capitalist reproduction is thus subject to recurrent disruptions driven or manifested in shortages of demand relative to produced commodities and acquired productive capacities. Inasmuch as this view amounts to a rejection of Say's Law over some time horizon, it enjoys broad support among heterodox currents.[3]

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[2] "It is purely a tautology to say that crises are caused by the scarcity of solvent consumers, or of a paying consumption.... If any commodities are unsaleable, it means that no solvent purchasers have been found for them.... But if one were to attempt to clothe this tautology with a semblance of a profounder justification by saying that the working class receive too small a portion of their own product, and the evil would be remedied by giving them a larger share of it, or raising their wages, we should reply that crises are precisely always preceded by a period in which wages rise generally and the working class actually get a larger share of the annual product intended for consumption. From the point of view of the advocates of 'simple'(!) common sense, such a period should rather remove a crisis." Marx (1893), 475-476.

[3] Going back to Malthus, Marx, and of course Keynes and Kalecki.

Under-consumptionist contributions take significant analytical steps beyond this first important insight. In their most comprehensive expressions, fundamental features of the accumulation of capital are understood to result in systematic demand shortages that contribute to chronic tendencies towards crisis, militarism and war, or to long-term stagnation. In different ways, this is the broad structure of the arguments in Luxemburg's (1913) "problem of realisation", the monopolistic capitalisms of Hobson (1902) and Baran and Sweezy (1966), and in Steindl's (1952) Kaleckian-inspired stagnationism. Quite apart from the theoretical and empirical merits of these contributions, it should be recognised that they contained integrated theorisations of the secular development of capitalism, and of possible endogenous obstacles and contradictions it faces.

Contemporary contributions on "wage-led growth" have offered more partial discussions, seeking to establish either the analytical possibility or empirical purchase of positive associations between the wage share of aggregate income and the level of output or rate of growth. In this they have been broadly based on Kalecki (1971) and Steindl (1952). Dutt (1984) offers an early, explicit formalisation motivated by arguments concerning the role of income inequality in the stagnation of the Indian economy since the mid-1960s.[4] Del Monte (1975) and Rowthorn (1981) independently developed akin frameworks.[5] The broad outlines of these approaches are considered by Taylor (1985), who integrates them into a broader stagnationist growth model.

But the most directly influential contribution to recent arguments for "wage-led growth" has been provided by Marglin and Bhaduri (1990). The paper sought to defend the idea of "wage-led growth" in the face of the unravelling of the post-War "Golden Age" of capitalism, a period of simultaneous high growth and rising real wages in the US and Western Europe. Their basic argumentation is straightforward. Whether or not an economy is following a "wage-led" regime is an empirical question. To the extent that savings rates of capitalists exceed those of workers, a shift in the distribution of income in favour of wage earners will boost demand. As long as this effect outweighs any possible decreases in investment arising from the redistribution of income in favour of wages, its net effect will be greater demand and higher levels of output. This simple idea has

[4] The argument is Stendlian: Producers are oligopolistic and operate with permanent excess capacity, capitalists have lower consumption propensities than workers, and investment hinges positively on capacity utilisation rates, ensuring investment accelerator effects enhance the effect on output of greater wage shares in income.

[5] See Lavoie (1995).

recently animated and supported a growing heterodox literature on the possible existence of "wage-led growth" or "wage-led demand regimes".[6]

This paper develops a critique of the "paradox of cost" or "wage-led growth" founded on the Circuit-of-Capital macroeconomic framework.[7] It applies the deliberate consideration of the outlay structure or monetary circuits of capitalist reproduction offered by that framework to analysis of the relationship between demand, the level or pace of economic activity, and the functional or class distribution of income. The resulting approach offers a new perspective on the determinants of the distribution of aggregate income, and fundamentally challenges the analytical and policy purchase of "wage-led growth". It also embodies a broad treatment of demand determination, based on the concept of *turnover time*, that is distinct from and analytically broader than the neo-Kaleckian treatments based only on rates of fixed-capital utilisation associated with "wage-led growth".

The critique results from the following considerations. Neo-Kaleckian contributions motivating the "paradox of costs" suppose output is sold entirely upon production. Most immediately, this is at odds with the empirical evolution of inventories which, as shown in figures 1 and 2 for the US economy, exhibits important cyclical fluctuations and a notable falling trend over the past twenty years. While abstraction from such developments may assist the pursuit of many analytical goals, it hampers inquiry into the aggregate, class distribution of income. If sales follow immediately upon production, wages and profits appear as a simple division of total output. In such settings, the distribution of income is exhaustively given by the real wage and available production techniques.

<Figures 1 and 2 Around Here>

In contrast, deliberate consideration of the structure of class outlays and revenues or monetary circuits in capitalist accumulation makes clear that wages and profits are not a sharing of output. In the Circuit of Capital, wage and profit flows represent fundamentally different moments of the process of accumulation. Wages are part of current capital outlays made by enterprises as they decide to undertake production. They are thus conditioned by the prospects of profits and the ability of enterprises to finance undertakings. Profits are a fraction of sales, corresponding to mark-ups made possible by the exploitation of labour power. They will be funded by current demand of

[6] See Stockhammer and Onaran (2012) and Onaran and Galanis (2012) for good reviews.

[7] As formally codified by Foley (1982, 1986) on the bases provided by of Marx (1885).

enterprises for non-labour productive inputs, and as such also conditioned by productive decisions. But they are additionally conditioned by the consumption decisions of households of workers and capitalists. The aggregate distribution of income between wages and profits is thus conditioned not only by the real wage and labour-to-output ratios, but by the relationship between commitments to produce and commitments to consume. Notably, recognition of the significance of this relationship is at the heart of all rejections of Say's Law, and of the understanding that, over some time horizons, demand may independently condition the level or pace of economic activity.

This perspective poses critical consequences for the concept of "wage-led growth". In its most common expression, the concept relies on a non-existent causal relationship between two quantities that are jointly determined by the relative measure of aggregate demand and capital outlays. Associations between income distribution and the level or pace of economic activity are *confounded*, reflecting only the distinct effect of broader developments on each one of the two measures. Further, the direct, mutual dependence of the incomes of workers and capitalist enterprises on their obverse expenditures turns the neo-Kaleckian understanding of the role the consumption propensities of wage earners plays in conditioning the relationship between real wages and output on its head. Under plausible, general conditions, greater measures for those propensities yield *decreases* in the comparative-static derivative of output on the real wage.

These limitations clearly beg analytical and policy alternatives. Analytically, the relationship between output (or rate of growth) and income distribution needs to be explicitly understood as confounded. While not conducive to the causal arguments based on "wage-led growth", this may result in the identification of changes in an economy's parameters that simultaneously boost levels or paces of economic activity and the wage share of aggregate income. Such an approach may help support positive policy arguments for measures and outcomes favourable to wage earners, without the analytical problems of "wage-led growth".

More broadly, the paper's discussion suggests that evolutions in which demand is supported by sustained, higher relative levels of investment will exhibit higher wage shares than otherwise comparable evolutions. Conversely, economies with comparably higher measures of aggregate demand relative to capital outlays will evolve with higher profit shares than otherwise comparable economies. As such the paper suggests recent "consumption-led growth" strategies pursued in the

US, Britain, and a range of upper middle-income countries may have directly contributed to rising income inequality, over and above the effects of falling or stagnant real wages in many of those economies. Policy interventions may be formulated and advanced with reference to alternative, "investment-led growth" paths, which will generally result in comparably higher wage shares.

The paper develops, illustrates, and analytically situates these points as follows. Section two summarises the reference, comparative-static approach to distribution and output as summarised by Bhaduri (2009). The section contrasts to that approach an analogous, Marxian framework of demand determination in which the class distribution of income is shaped by the real wage, capital outlays, and aggregate demand. The following two sections develop and illustrate some of the consequences of the resulting approach with comparative-static exercises considering the impact on output and income distribution of changes to or shifts in the real wage, capital outlays, and consumption by workers. Their findings help motivate not only the problems with "wage-led growth", but also the analytical and policy purchase of arguments for "investment-led growth".

Sections five and six consider the paper's arguments in dynamic settings, in which capital outlays and aggregate demand shape the evolution of productive and financial stocks that may in turn influence outlays. They lay the bases for well-specified dynamic models of accumulation accounting for the determinants of distribution considered by the paper; establish the manner in which the paper's arguments apply to exponential-trend evolutions; and illustrate how comparative-dynamic parameter movements yielding positive confounded associations between wage shares and rates of growth may be identified. The discussion also motivates the Circuit of Capital framework as a generalisation of neo-Kaleckian models. Section seven offers a summary conclusion.

2. Two Different Approaches to Distribution

The most effective, summary statement of the mechanisms behind "wage-led" and "profit-led" growth was recently put forward by Badhuri (2009), based on the earlier influential contribution of

Marglin and Badhuri (1990).[8] It is derived easily from the standard income-expenditure identity. All outlays are conceived statically, or during time lapses brief enough to ensure stocks and the economy's productive capacities do not change. As such, outlays may only be understood to hinge on other expenditure flows or parameters. Normalising the income-expenditure relation to the unchanging level of capacity output yields the income identity,

$$y = d^w[\omega] + d^c[\pi] + I[y,h] \tag{1}$$

Where $d^w[\omega]$ denotes workers' consumption as a function of wages, $d^c[\pi]$ denotes capitalist consumption as a function of profits, and $I[y,h]$ is the investment function. The aggregate distribution of income is taken as exogenous, with the parameter h measuring the profit share of total income, ensuring profits and wages are given respectively by $\pi = hy$, and $\omega = (1-h)y$. Total differentiation of (1) yields the slope of the IS curve,[9]

$$\frac{dy}{dh} = \frac{I_h[y,h] - y\left(d^w_\omega[\omega] - d^c_\pi[\pi]\right)}{\left(1 - d^w_\omega[\omega](1-h) - d^c_\pi[\pi]h\right) - I_y[y,h]} \tag{2}$$

Note that the denominator in (2) consists, respectively, of the marginal impact of increased income on savings and on investment. Ruling out unstable income-multiplier regimes, this denominator will be positive. As a result, the sign of the derivative in (2) depends on the sign of the numerator. "Wage-led growth", understood as a setting in which falls in the exogenous profit share lead to higher levels of output relative to capacity, thus requires,

$$I_h[y,h] \leq y\left(d^w_\omega[\omega] - d^c_\pi[\pi]\right) \tag{3}$$

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[8] More general, dynamic statements of the exposition that follows have been offered by many contributions. Taylor (1985), for instance, does so while incorporating explicit consideration of the evolution of prices and nominal wages in endogenously shaping cost mark ups and consequently the distribution of income. In any such setting the "wage-led growth" argument is generalised to a statement concerning shifts favourable to wage shares in the processes determining the evolution of the real wage. More recent contributions, like Tavani et al (2011), Nikiforos and Foley (2012), and Palley (2013) have sought to enrich the "wage-led growth" argument by considering the possibility of non-linear distributive-equilibrium schedules in capacity-utilisation/income-share space. In those cases it is possible an economy possesses both "wage-led" and "profit-led" equilibria, at different levels of capacity utilisation. While offering more nuanced accounts, these contributions are still subject to the critique that follows below.

[9] Using the convention that for any variables x^a and y, x^a_i and y_i denote the derivatives of with respect to i.

If the consumption functions are linear, the lower-bound condition in (3) will be expressed relative to the marginal propensity to consume of workers and that of capitalists. The condition for may be more generally expressed in relation to income elasticities,[10]

$$I_h[y,h] \leq \eta_{\omega}^{dw} d^w[\omega] - \eta_{\pi}^{dc} d^c[\pi] \qquad (4)$$

The relationship between aggregate income distribution and the level of economic activity behind the "wage-led growth" defined in (4) is entirely demand centered. It arises exclusively as a function of the responsiveness of demand by workers relative to that of capitalists to changes in their respective incomes. If the former is sufficiently larger than the latter to outweigh the positive effect of higher profit shares on investment, higher wage shares boost demand and capacity utilisation.

The analytical observation upon which this paper is founded is that these results hinge on a limited, if conventional understanding of the aggregate distribution of income as an exogenous, *ex-post* sharing of output. Deliberate consideration of the actual sequence and structure of class income flows in capitalist reproduction quickly reveals that, as emphasised by Marxian political economy, wage and profit flows arise from fundamentally different moments of capitalist reproduction. Wages are a part of capital outlays by enterprises, which fund purchases of non-labour inputs and the income flows of wage earners. Profits are the realisation of mark-ups through sales supported by aggregate demand. Once this structure is imposed onto analysis of expenditures and incomes, a fundamentally different relationship between income distribution, the level of economic activity, and demand behaviour emerges.

In motivating its results, the paper will first make use of variations of the following static, demand-determined exercise, following along parallel lines to the example above. All flows are measured in relation to existing levels of productive and financial stocks. As above, suppose all flows are measured relative to the full-capacity level of output. In contrast to the approach above, the sequenced structure of outlays in capitalist reproduction is imposed, using the broad approach of Foley's (1982, 1986) formalisation of the Circuit of Capital. Wages are taken as a fraction κ of

[10] Where η_i^x measures the elasticity of x with respect to i, according to the explicit relationship in question.

capital outlays, termed the composition of capital. Profits are taken as the realisation of a mark-up q on the production cost r of commodities sold.

Along conventional Marxian lines, the mark-up is given by $q = \kappa\varepsilon$, where ε is the rate of exploitation, or ratio between paid and unpaid labour time, taken as determined through point-of-production and broader socio-political struggles. In this setting, profits will be given by qr. In the exercises that follow it will be supposed that capital outlays have a positive dependence on profit flows. In the present, static setting this may be interpreted as the simple supposition that the measure of capital outlays relative to productive capacities (and to the preferences shaping the wealth portfolios supporting them) is conditioned by contemporaneous profitability. Supposing for now that the mark-up rate is constant, capital outlays may be simply depicted by $z[r]$. Wage flows will thus be given by $\kappa z[r]$.

It should be evident that both the scale of economic activity and the aggregate distribution of income will be endogenous to the outlay behaviour of enterprises, capitalist households, and workers in this setting. Aggregate demand D will fund sales at a mark-up $(1+q)$ on production costs, and will consist of capitalist demand for non-labour inputs plus demand for consumption goods by capitalists and workers. The latter are taken to depend only on their respective income flows, with all parameters for now implicit in the relevant consumption functions. All of this yields the static identity of aggregate demand and sales,

$$(1+q)r = (1-\kappa)z[r] + d^w[z[r]] + d^c[r] \qquad (5a)$$

In this demand-determined exercise, the cost-accounted level of sales r provides the central measure of the scale of output or economic activity.

This framework poses a number of differences in relation to more conventional neo-Kaleckian approaches. First, equation (5a) yields a distinctive version of the identity between investment and savings. Supposing all profits are paid to capitalist households, savings are given by $s^c[r] = qr - d^c[r]$, $s^w[z] = \kappa z - d^w[z]$, and (5a) may be stated as either,

$$(1+q)r - d^c[r] + s^w[z[r]] = z[r] \tag{5b}$$

or

$$s^c[r] + s^w[z[r]] = z[r] - r \tag{5c}$$

Equation (5b) is taken to show how capital outlays fund commensurate savings by workers and by the aggregate capitalist sector. Note that in the present framework this identity does not require aggregate commodity-market equilibrium. As (5c) makes clear, it follows directly from the accounting identity requiring the net change in financial surpluses by all sectors to add up to zero.

Second, the condition defining stable evolutions in this setting will be different than the conventional Keynesian condition. Aggregate demand behaviour will only be stable relative to perturbations in the level of sales if the derivative of total demand as given in (5a) does not exceed the mark-up factor $(1+q)$. Formally, the demand regime will be stable when,

$$\rho_{nl}\eta_r^z + \rho_c\eta_r^{dc} + \rho_w\eta_z^{dw}\eta_r^z \leq 1 \tag{6}$$

Where ρ_{nl}, ρ_c, and ρ_w respectively denote the shares in total demand $(1+q)r$ of outlays for non-labour inputs, consumption by capitalists, and consumption by workers. Put differently, once the structure of outlays and incomes is considered, a demand regime will be stable only when the income elasticities of outlays or demand, weighted by their shares in aggregate demand, average to no more than unity. Note that the condition does not preclude any single elasticity measure from exceeding unity, as long as the others are sufficiently low to ensure (6) holds. While the results motivated in what follows will typically generalise for non-stable regimes, the exposition will for simplicity be carried on the assumption that condition (6) is true.

The aggregate distribution of income will also have a distinctive expression in this setting. It will be given by the ratio of profits to wages, and thus dependent on both capital-outlay and consumption decisions. Formally, it will be given by,[11]

[11] Note the last step in this expression hinges on commodity values being given by the present reproduction labour time.

$$h[r] \equiv \frac{qr}{\kappa z[r]} = \varepsilon \frac{r}{z[r]} \tag{7}$$

Alongside the identities in (5), this expression for the profit share supports three conclusions.

First, the aggregate distribution of income may be understood to be most generally conditioned by the rate of exploitation, as emphasised by Marxian contributions. As such, it will be subject to all the productive, labour-market, and broader social conflicts determining the division of the working day between paid and unpaid labour. While some of these determinations will be socio-political and arguably best understood as exogenous to the macroeconomic variables under consideration here, the evolution of labour-market conditions may ensure this rate is subject to business-cycle variations.[12] But the definition in (7) suggests an additional determination of the functional or class distribution of income, taking place in the sphere of circulation and driven by the consumption, savings and borrowing behaviour of wage earners and capitalist households.[13]

Recent policy and market developments in many economies have bestowed considerable significance to this determination in contemporary capitalism. Wage earners have been encouraged to acquire assets and incur liabilities as part of their social reproduction, subjecting their consumption behaviour to the influence of balance-sheet considerations, as well as cyclical and secular financial developments.[14] Under the light cast by (7), these processes should also be understood to impact the aggregate distribution of income over and above any net financial transfers occurring as a function of the distribution of assets, liabilities, and attendant cash flows.

Second, as both the aggregate distribution of income and the level of output are endogenous to outlays sustaining production and those sustaining consumption, both measures will have no mutual causal relationship. Changes to consumption and capital-outlay behaviour will separately effect changes on the level of output and on the balance of wage and profit income. The resulting associations between the two measures will be confounded effects arising from underlying changes to outlay behaviour. Different changes affecting consumption and capital outlays will generally

[12] The obvious reference in this regard is Goodwin (1967).

[13] This determination of is implicit in all Circuitist approaches. See Graziani (2003) and Lavoie (1992).

[14] The benchmark references on these processes and "financialisation" are Lapavitsas (2009) and dos Santos (2009).

result in very different associations between output and distribution. In this setting the simplest statement of "wage-led growth", namely that improvements in distribution will *cause* better economic performance, has no analytical purchase.

Third, in the approach articulated here, the relationship between consumption behaviour, income distribution, and output is fundamentally different from that underpinning the "wage-led growth" result in condition (4). The aggregate distribution of income is shaped by the relative measure of sales to capital outlays, each of which conditions the other. Consumption decisions mediate the effect of capital outlays on sales, so that for a given elasticity of capital outlays relative to sales η_r^z,

the responsiveness of aggregate demand will be given by,

$$\eta_r^D = \rho_{nl}\eta_r^z + \rho_c\eta_r^c + \rho_w\eta_z^w\eta_r^z \tag{8}$$

As in conventional approaches, both income elasticities of consumption will be positively related with aggregate demand and thus with output. But two important differences should be noted. First, the contribution of workers' demand responsiveness to aggregate demand and output is weighted by the responsiveness of capital outlays. In the Marxian framework, the reproduction of workers is but a moment in the reproduction of capital. Their consumption cannot generally boost accumulation beyond the commitment of capital value to production that funds wage payments.[15] Second, greater responsiveness in consumption by workers and capitalists boosts sales relative to capital outlays, thus favouring profit shares in total income. As is shown in the next section, these mechanisms easily turn neo-Kaleckian intuition regarding the role of the consumption behaviour of wage earners in shaping the relationship between real wages and output on its head.

A final point to note in relation to (7) is that in any setting in which capital outlays are equal or proportional to aggregate demand, the functional distribution of income will be shaped exclusively by the rate of exploitation. This is the case in the standard neo-Kaleckian setting where production meets demand through adjustments in rates of capacity utilisation, but no explicit account is given of the evolution of productive capacity and its relationship to production decisions.

[15] The impact of consumption credit, which partially relaxes this statement, is taken up explicitly in section four.

3. Exploitation, Real Wages, Output and Distribution

The distinctive mechanisms shaping the relationship between consumption, output, and distribution in the present framework may be illustrated with comparative-static exercises along the same lines as those offered by the "wage-led growth" literature. This section does so by considering first the impact of changes in the rate of exploitation, which provides a negative measure of the real wage, on both output and the class distribution of income. It also considers the impact on output of outright redistributions of shares of profits in favour of wage earners. As these exercises will show, the dependence of wages on capital outlays by enterprises ensures the interrelationship between consumption behaviour, income distribution, and output is fundamentally different from that foreseen by recent neo-Kaleckian contributions motivating "wage-led growth". This points to the need to broaden those approaches when considering any setting where decisions to consume and conditioned independently from decisions to produce.

Consider first variations in the rate of exploitation. As long as the composition of capital does not change, movements in that rate may be represented by proportionate movements in the mark-up rate. To consider the impact of such changes, it is necessary to make explicit the dependences of outlays on incomes, and of profits on the mark-up rate,

$$(1+q)r = (1-\kappa)z[\pi] + d^w[\omega] + d^c[\pi] \tag{9}$$

$$h[r,q] \equiv \frac{qr}{\kappa z[\pi]} \tag{10}$$

Where $\pi = \pi[r,q] = qr$, and $\omega = \omega[\kappa, z[\pi]] = \kappa z[\pi]$.

The relationship between the mark-up rate and the level of sales can be derived implicitly from (9),

$$\frac{dr}{dq} = \frac{r\left(-1 + (1-\kappa)z_\pi[\pi] + d^c_\pi[\pi] + \kappa d^w_\omega[\omega] z_\pi[\pi]\right)}{(1+q) - q\left((1-\kappa)z_\pi[\pi] + d^c_\pi[\pi] + \kappa d^w_\omega[\omega] z_\pi[\pi]\right)} \tag{11}$$

Along stable evolutions the denominator of (11) is positive, ensuring the numerator gives its sign to the entire derivative. The numerator thus illustrates the two distinct effects set into motion by

changes in the rate of exploitation or in the mark-up rate. First, they increase the level of demand necessary to realise surplus value in produced output commodities. As such and *ceteris paribus*, they reduce the total value of output commodities realised for any given level of demand. Second, greater rates of exploitation may result in greater capital outlays, which fund greater wage and sales flows, also boosting consumption by both capitalists and workers. The net effect on output of increases in the rate of exploitation will follow from the balance of these two effects. The rate of exploitation will be positively associated with levels of output as long as,[16]

$$\frac{q}{(1+q)} \leq \rho_{nl}\eta_r^z + \rho_c\eta_r^{dc} + \rho_w\eta_z^{dw}\eta_r^z \tag{12}$$

As in the "wage-led growth" condition given by (4), the effect of greater rates of exploitation on output is ambiguous, and hinges on the income elasticities of consumption and of capital outlays. In contrast to the mechanism underpinning "wage-led growth", the consumption elasticities of workers and capitalists, and that of capital outlays by capitalist enterprises, play parallel roles in the determination of the net resulting effect, with higher values for all of them making a positive association between the rate of exploitation and output more likely. Note that counter to condition (4), higher values for the income elasticity of demand for workers result in higher absolute values for the derivative of output on the mark-up rate. This is exactly the opposite role played by consumption behaviour in conditioning the relationship between distribution and output in the neo-Kaleckian frameworks yielding condition (4).[17]

Considering now the impact of changes in the rate of exploitation on the realised class distribution of income. This will be given by the total derivative of distribution with respect to the mark-up rate,

$$\frac{dh[r,q]}{dq} \equiv \frac{\partial h[r,q]}{\partial q} + \frac{\partial h[r,q]}{\partial r}\frac{dr}{dq} \tag{13}$$

Presented explicitly this yields,

[16] Since $q(1+q)^{-1} < 1,\ \forall q \geq 0$, there are stable demand regimes under which (12) holds.

[17] Note that under unstable demand regimes, (6) does not hold, the denominator of (11) is negative, and condition (12) is reversed. While this will ensure that greater consumption propensities by wage earners result in lower values for the derivative of sales on the mark-up rate in (11), the mechanisms at work a wholly different from those yielding the "wage-led" condition in (4). In fact, higher income elasticities of capital outlays will similarly result in lower values for (11).

$$\frac{dh}{dq} = \frac{r\left(z[\pi] - qrz_{\pi}[\pi]\right)}{z[\pi]^2\left((1+q) - q\left((1-\kappa)z_{\pi}[\pi] + d^c_{\pi}[\pi] + \kappa d^w_{\omega}[\omega]z_{\pi}[\pi]\right)\right)} \tag{14}$$

Under stable demand regimes the denominator of (14) is positive, ensuring this derivative is negative whenever, $\eta^z_r > 1$. [18] This requirement is compatible with stable demand regimes as long as the income elasticities of demand for consumption goods are sufficiently low so that,

$$1 < \eta^z_r < \frac{1 - \rho_c \eta^{dc}_{\pi}}{\rho_{nl} + \rho_w \eta^{dw}_{\omega}} \tag{15}$$

In such settings, increases in rates of exploitation lead, paradoxically, to falls in the realised profit share of income. This may arise even when the increase in the mark-up rate results in an increase in aggregate demand and sales, as long as high responsiveness of capital outlays is compensated by a sufficiently low responsiveness of consumption outlays, ensuring both (15) and (12) hold.

A different illustration of how the dependence of wages on capital outlays yields results at variance from the standard neo-Kaleckian intuition can be obtained by considering direct attempts to transfer realised incomes from capitalists to wage earners. This is akin to the changes in the income-distribution parameter *h* in the "wage-led growth" exercises leading to (4), and is pursued here through consideration of a lump-sum tax on profits paid *in toto* to wage earners. This ensures the net income of capitalists and workers are respectively, $n_c = qr - \theta$, and $n_w = kz\left[n_c\right] + \theta$.

In this setting, the aggregate-demand condition becomes,

$$(1+q)r = (1-\kappa)z\left[n_c\right] + d^w\left[n_w\right] + d^c\left[n_c\right] \tag{16}$$

The aggregate distribution of income, accounting for the redistribution, becomes,

[18] Note that if this elasticity is equal to unity the derivative in (14) is zero. This will always be the case in any setting where production responds commensurately and instantaneously to demand, as in the standard neo-Kaleckian scenario. In such cases there is no practical distinction between purchasing and production decisions, and the determinations of distribution considered by this paper and leading to (14) do not arise.

$$h[r,\theta]=\frac{n_c}{n_w}=\frac{qr-\theta}{\kappa z[n_c]+\theta} \tag{17}$$

The impact of changes in the level of lump-sum redistribution on the level of output is implicitly given by (16), from which it is possible to obtain,

$$\frac{dr}{d\theta}=\frac{d^w_{nw}[n_w]n^w_\theta-\left(d^c_{nc}[n_c]+(1-\kappa)z_{nc}[n_c]\right)}{(1+q)-q\left(d^c_{nc}[n_c]+(1-\kappa)z_{nc}[n_c]+\kappa d^w_{nw}[n_w]z_{nc}[n_c]\right)} \tag{18}$$

Where $n^w_\theta=1-\kappa z_{nc}[n_c]$ is the derivative of aggregate wage income with respect to θ.

Considering only stable demand regimes, under which the denominator of (18) will be positive, comparative-static increases in lump-sum redistribution result in greater levels of output when,

$$d^w_{nw}[n_w]n^w_\theta-d^c_{nc}[n_c]>(1-\kappa)z_{nc}[n_c] \tag{19}$$

Note that since $n^w_\theta\leq 1,$ this is a stronger version of the requirement for "wage-led growth" given by (3). Inasmuch as the lump-sum tax on profits reduces private capital outlays, it will also reduce aggregate wage flows, *ceteris paribus*. This will undermine any positive effect on aggregate demand following from high consumption propensities by wage earners. It is even *conceivable* that high labour intensity and responsive capital outlays ensure $n^w_\theta<0,$ implying comparative-static lump-sum redistributions result in lower aggregate wage flows, and that (19) never holds. Discounting such cases and considering only settings where $n^w_\theta>0,$ increases in the lump-sum tax will result in greater levels of output when workers' income elasticity of demand is sufficiently strong to ensure,

$$\eta^{dw}_{nc}>\frac{\rho_{nl}\eta^z_{nc}+\rho_c\eta^{dc}_{nc}}{h[r,\theta]\rho_w n^w_\theta} \tag{20}$$

It is important to note explicitly that these results demonstrate how the framework advanced by the paper allows for integrated consideration of the two distinct processes typically highlighted by opposing sides in policy debates concerning the desirability of redistributions of income: The posited gains arising from greater consumption propensities of wage earners, and the posited losses arising from the negative effects of redistributive taxation on capital outlays, employment, and thus on aggregate wages. Note finally that while not considered here, the possibility that increases in real wages may result in falls in the labour intensity of productive processes would exacerbate the effects accounting for the central results obtained by these exercises.

4. Capital Outlays, Workers' Consumption and the Endogeneity of Distribution

This section offers two additional exercises that help draw out the consequences of the determination of the class distribution of income developed by this paper, and illustrate the confounded character of associations between distribution and output. They also help lay the foundations for an analytically sound alternative to "wage-led growth" based on the distinction between "investment-led" and "consumption-led" growth. The exercises consider the comparative-static impact of a positive exogenous shift directly increasing only capital outlays, and that of a similar shift directly increasing only consumption by wage earners. Under generally plausible conditions, these changes have opposite effects on the class distribution of income, even while equally boosting demand and output.

Formally, consider a simple generalisation of the framework above. Let capital outlays and workers' consumption each depend positively on additional parameters λ and υ respectively. These two parameters may stand for anything autonomously boosting capital outlays and consumption by workers. Here they will be referred to as respective measures of leverage boosting those expenditure flows. Total sales will then be given by,

$$(1+q)r = (1-\kappa)z[r,\lambda] + d^w[z[r,\lambda],\upsilon] + d^c[r] \tag{22}$$

This implicitly defines sales as an endogenous function of the leverage parameters and outlay functions, so that for a given specification of the latter, $r = r[\lambda,\upsilon]$. Income distribution will be,

$$h[\lambda,\upsilon] \equiv \frac{qr[\lambda,\upsilon]}{\kappa z[r,\lambda]} \tag{23}$$

Consider now movements in the leverage parameters. It should be obvious that greater leverage in outlays will boost sales and output, irrespective of the outlay in question. Yet they can be shown to have very different effects on the aggregate distribution of income under generally plausible conditions. Consumption credit will generally increase profit shares in aggregate income, while production credit will generally increase wage shares.[19] This is a significant finding concerning the macroeconomic content of different credit allocations in its own right. It also illustrates the determination of income distribution emphasised by the present paper, and attests to the difficulties posed when considering the relationship between two endogenous variables. Different parameter shifts, in this case in the measures of leverage supporting consumption by workers or capital outlays, lead to different associations between the profit-share and the level of output.

Formally, an increase in leverage in capital outlays would change distribution according to,

$$\frac{dh[\lambda,\upsilon]}{d\lambda} \equiv \frac{\partial h[\lambda,\upsilon]}{\partial \lambda} + \frac{\partial h[\lambda,\upsilon]}{\partial r}\frac{dr}{d\lambda} \tag{24}$$

Obtaining the necessary derivatives from (22) and (23) yields,

$$\frac{dh[\lambda,\upsilon]}{d\lambda} = \frac{qz_{\lambda}[r,\lambda]\Big(r\Big((1+q)-d_r^c[r]\Big)-z[r,\lambda]\Big((1-\kappa)+d_z^w\big[z[r,\lambda],\upsilon\big]\Big)\Big)}{-\kappa z[r,\lambda]^2\Big((1+q)-\Big(d_r^c[r]+z_r[r,\lambda]\Big((1-\kappa)+d_z^w\big[z[r,\lambda],\upsilon\big]\Big)\Big)\Big)} \tag{25}$$

The term inside the parentheses in the denominator of (25) is the derivative of the definition of aggregate sales given by (22), expressed as an excess supply, with respect to the level of sales. Stability requires that it be positive. Since by hypothesis $z_{\lambda}[r,\lambda] > 0$, the sign of the derivative in (25) will be negative as long as,

[19] A dynamic version of this finding, posed in the terms of the canonical, continuous-time formalisation of the Circuit of Capital developed by Foley (1982, 1986), is offered in dos Santos (2013).

$$(1+q)r-(1-\kappa)z[r,\lambda]>rd_r^c[r]+z[r,\lambda]d_z^w\left[z[r,\lambda],\upsilon\right] \tag{26}$$

Using the fact that the left-hand side in (26) is the demand for consumption goods, and expressing the relationship in terms of income elasticities of demand, it is evident that, the profit share will be falling on the measure of production credit whenever,

$$\eta_z^{dw}\frac{d^w\left[z[r,\lambda],\upsilon\right]}{d^w\left[z[r,\lambda],\upsilon\right]+d^c\left[r\right]}+\eta_r^{dc}\frac{d^c\left[r\right]}{d^w\left[z[r,\lambda],\upsilon\right]+d^c\left[r\right]}<1 \tag{27}$$

In words, the impact of production credit (or anything directly boosting only capital outlays) on income distribution depends on the weighted-average responsiveness of demand for consumption goods by all households. If the average income elasticity of demand is smaller than unity, greater paces of production credit will improve wage shares, as their impact on wages will proportionately exceed their impact on sales and profits. Condition (27) is plausible and met formally in any setting where marginal consumption propensities fall on income.

Consider along similar lines consumption credit. The corresponding derivative of distribution is,

$$\frac{dh[\lambda,\upsilon]}{d\upsilon}=\frac{qd_\upsilon^w\left[z[r,\lambda],\upsilon\right]\left(z[r,\lambda]-rz_r[r,\lambda]\right)}{\kappa z[r,\lambda]^2\left((1+q)-\left(d_r^c[r]+z_r[r,\lambda]\left((1-\kappa)+d_z^w\left[z[r,\lambda],\upsilon\right]\right)\right)\right)} \tag{28}$$

Following the same line of reasoning as above, consumption credit will improve the profit share as long as the numerator is positive. Expressed in relation to elasticities, the requirement is, simply,

$$\eta_r^z<1 \tag{29}$$

The impact of consumption credit on the aggregate distribution of income will hinge on the responsiveness of capital outlays to increases in sales consequent to the debt-supported increase in worker outlays. As long as increases in capital outlays are proportionately smaller than those in sales, consumption credit will increase the profit share of aggregate income.

Conditions (27) and (29) identify the settings in which production and consumption credit respectively increase and decrease the wage share in aggregate income.[20] The limits on outlay responsiveness they contain will also ensure that the demand-stability requirement in (6) is met. In fact, it should be evident that under stable demand regimes, at least one of these two conditions must hold. It should be reasonable to expect to find many instances in which both conditions hold, and where each credit allocation yields opposite effects on the aggregate distribution of income.

These results are interesting in their own right, especially given the significant recent reorientation of bank credit in favour of consumption and mortgage loans (which may indirectly support consumption) across a range of advanced and middle-income economies. They also illustrate the difficulties posed when considering the relationship between two jointly-determined variables. Under conditions (27) and (29), the confounded relationship between output and income distribution has opposite signs, depending on whether overall demand is being boosted by direct increases in production or consumption undertakings. As illustrated below for comparative steady-state evolutions, different changes in the economy generally result in different associations between growth and distribution.

These results also have important policy implications, as they suggest the need for alternatives to the broad macroeconomic agenda associated with the concept of "wage-led growth". Any given development or policy intervention helps shape income distribution not only through its impact on the real wage and net incomes, but also through its relative impact on capital and consumption outlays. In conjunction with the results in section three, this provides broader bases on which to assess the role of any given policy measure or broader development on growth and distribution than an exclusive focus on real wages and net incomes.

Macroeconomic policy in the US, Britain, and a number of other economies has recently sought to increase the extent to which growth in aggregate demand is supported by increases in consumption. Financial-sector, real-estate, and credit market policies have broadly promoted asset-price inflation, wealth effects on consumption, consumption credit, and consequent high rates of growth in consumption by wage earners. These developments resulted in dramatic falls in

[20] It is left to the reader to verify that if all income elasticities of outlays exceed one and the demand regime is unstable, increases in the two shift parameters have the same effects on distribution as in the stable case, but will reduce output. Both parameters will have the same effect on distribution only when the elasticity of capital outlays and the average consumption elasticity are configured so that one of them exceeds while the other falls short of unity.

savings rates in the US and British economies in the years leading up to the 2008.[21] Absolute increases in consumption were not matched by proportional increases in capital outlays, private or public. Consumption expenditures rose from accounting respectively for 63 and 53 percent of GDP in 1977 in each country, to 70 and 65 percent in 2009.[22] Growth strategies along such lines, which effectively increase consumption shares in national expenditure are termed here "consumption-led growth" strategies. From the perspective developed in this paper, such strategies contribute directly to increases in the profit share of aggregate income.

These considerations suggest that the high-growth, rising-wage-share macroeconomic evolutions sought by proponents of "wage-led growth" may be achieved through converse "investment-led growth" strategies. These would aim for periods of high growth in capital outlays, both absolutely and in relation to growth in consumption and overall aggregate demand. Under such evolutions growth would be high, consumption shares would fall, and the functional distribution of income would shift in favour of wage earners even at constant real wages. Consideration of evolutions along these lines begs broader and more ambitious macroeconomic policy agendas than calls for higher wages or better distributions of income. In a closed (or world) economy, the sustainability of "investment-led growth" will be conditioned by the ability of a decentralised, profit-driven economy to continue boosting levels of productive investment in the face of the greater measures of productive capacity and inventories, and rising real wages that are likely to result along such evolutions. It thus poses questions concerning the relative merits and possible roles of private and public enterprises in underpinning more equitable patterns of high economic growth, profit-driven versus public-service imperatives in economic decisions, and on the public-good character of aggregate capital outlays.

5. Productive and Financial Stocks, and Dynamic Evolutions

The exercises above have been founded on a simple comparative-static framework. This is sufficient to motivate the analytical caveats outlined above, as they apply over time spans in which changes in the economy's stocks are not significant. For longer time spans it is necessary to account for the evolution of stocks shaped by the flows under consideration, which in turn may condition

[21] Savings rates fell from about 10 and 14 percent in the US and Britain respectively in early 1980, to pre-crisis lows of 2 and 0.9 in late 2007/early 2008. Data is available from the US Federal Reserve and UK Office for National Statistics.

[22] Calculated from US Bureau of Economic Analysis and Bank of England Data.

outlay behaviour. Those include inventories, stocks of engaged inputs, fixed capital, financial assets and liabilities, existing and potential supplies of labour power, etc.

This section turns to the applicability of the points developed above to explicitly dynamic settings. The discussion helps flesh out the differences between the Circuit of Capital, as codified into a stock-flow consistent macroeconomic framework by Foley (1982, 1986), and conventional neo-Kaleckian approaches. It also identifies the conditions and manner in which the determination of income distribution identified above is relevant for long-term, exponential-trend evolutions.

In the Circuit of Capital, capital outlays add to stocks of engaged productive resources. This may be understood to include installation of fixed capital and expenditures and engagement of labour and non-labour resources to address its depreciation. I assume for simplicity that the *aggregate* share of the components of capital outlays is constant and exhaustively described by the composition of capital defined above. The completion of output commodities drains the stock of productive resources, while simultaneously adding to inventories. Commodity sales in turn drain inventories. Measuring inventories at production costs, and letting P_t denote output flows, and Π_t and N_t stocks of productive resources and inventories, this yields,[23]

$$\dot{\Pi}_t = Z_t - P_t \tag{30}$$

$$\dot{N}_t = P_t - R_t \tag{31}$$

The stock of capital is given by the sum of engaged productive resources and inventories and obeys,

$$\dot{X}_t = Z_t - R_t \tag{32}$$

It should be noted this contains a broader account than conventional neo-Kaleckian approaches of the actions of capitalist enterprise. They can respond to changing demand levels with a combination of letting inventory levels vary; adjustments to capital outlays; and changes to the rate of employment of fixed capital, which in the present context amounts to changing the pace at which the value embodied by that equipment is transferred onto outputs. Theorisation of these responses

[23] In line with Foley (1982, 1986). See also dos Santos (2013).

to aggregate demand may yield explicit accounts of the *evolution* of productive capacities and inventories, which are generally absent from neo-Kaleckian contributions.

Quite apart from such behavioural specifications, equation (32) makes clear the relationship between capital outlays and commodity sales that conditions the class distribution of income also drives the evolution of the aggregate capital stock,[24] and thus shapes aggregate profitability. This relationship also conditions the evolution of the net financial worth of wage earners, which if only simple debt and money portfolios are allowed, obeys,

$$\dot{M}_t^w = \kappa Z_t - D_t^w \tag{33}$$

The same relationship shapes the the net money position of the aggregate capitalist sector,

$$\dot{M}_t^c = (1+q)R_t - Z_t - D_t^c = D_t^w - \kappa Z_t \tag{34}$$

The scopes within which the relationship between capital outlays and aggregate demand may shape the class distribution of income will be constrained to the extent the economic system is subject to forces regulating the relative measures of the stocks described in (32), (33) and (34). This has direct bearing on the purchase the discussion offered above has in any dynamic setting, particularly in relation to long-term, exponential trends.

The first, structural constraint bearing on the evolution of stocks in accumulation was identified by Foley's (1982, 1986) original exposition. It is given by the fact that a demand regime is only sustainable in the long run if it ensures inventories are sufficiently large to prevent demand-pull inflation, which requires $N_t, X_t >> 0$.

More broadly, it should be obvious that the agency potentially regulating the evolution of these three stocks is the outlay behaviour of the corresponding sectors. In line with Foley (2013), suppose this behaviour is specifically conditioned by the ratio of each stock to the corresponding sector's revenues. Thus, capital outlays by enterprises may be understood to increase when total capital is small relative to sales, corresponding to settings of high profitability and rates of capacity

[24] Assuming no difference between historical and replacement costs of mobilised productive resources.

utilisation. Such responses would help prevent unstable evolutions for the total stock of capital. Along similar lines, consumption expenditures may rise as sectoral net worth improves in relation to sectoral incomes, keeping the net financial position of all households from divergent evolutions.

To the extent these countervailing forces do not operate instantaneously, there will be considerable scope in the economic system for potentially complex dynamic evolutions in which the ratio of aggregate demand to capital outlays fluctuates, supporting movements in the class distribution of income. While examining such evolutions is well beyond the scope of the present discussion, it is possible to consider the manner in which the determination of distribution motivated in this paper may have purchase across exponential-trend evolutions. To see this, define asset-to-revenue ratios for enterprises, $\rho_t^e \equiv \frac{X_t}{R_t}$; workers, $\rho_t^w \equiv \frac{M_t^w}{\kappa Z_t}$; and capitalist households, $\rho_t^c \equiv \frac{M_t^c}{qR_t}$.

Taking the time derivatives of these ratios, combining them with (32), (33), and (34), and letting γ_t^i denote the rate of growth of flow i yields expressions for the dynamic evolution of these ratios,

$$\dot{\rho}_t^e + \gamma_t^r \rho_t^e = \frac{Z_t}{R_t} - 1 \tag{35}$$

$$\dot{\rho}_t^w + \gamma_t^z \rho_t^w = 1 - \frac{D_t^w}{\kappa Z_t} \tag{36}$$

$$\dot{\rho}_t^c + \gamma_t^r \rho_t^c = \frac{\kappa Z_t}{qR_t}\left[\frac{D_t^w}{\kappa Z_t} - 1\right] \tag{37}$$

Paired with specifications for sectoral outlays as functions of the corresponding stock-flow ratios, $Z = Z[\rho_t^e], D^w = D^w[\rho_t^w]$, and thus $R = R[\rho_t^e, \rho_t^w]$, this yields well specified dynamic systems. It should be evident that those can easily yield fairly complex evolutions for the functional distribution of income, driven by the relative evolution of capital outlays and aggregate demand. Along any such paths, the determination of distribution motivated here will have direct purchase.

Consider now the system's long-term, exponential trend, upon which all such dynamics may be understood to take place. Mathematically, this trend is defined by a situation in which all stocks and flows grow at the same rate. In line with present purposes, they may also be understood as settings in which outlays maintain long-term, target levels of the stock-flow ratios, $\overline{\rho}^{e}, \overline{\rho}^{w}, \overline{\rho}^{c}$.

In such settings (35), (36), and (37) become,

$$\overline{\rho}^{e} = \frac{1}{g}\left[\frac{Z}{R} - 1\right] \tag{38}$$

$$\overline{\rho}^{w} = \frac{1}{g}\left[1 - \frac{D^{w}}{\kappa Z}\right] \tag{39}$$

$$\overline{\rho}_{t}^{c} = \frac{1}{g}\frac{\kappa Z}{qR}\left[\frac{D^{w}}{\kappa Z} - 1\right] \tag{40}$$

Here the equilibrium or target stock-flow ratios define a three-by-three system on the rate of growth, workers' propensity to consume, and class income distribution. Any trio of sectoral stock-flow targets fully specifies these three measures along the corresponding exponential-trend evolution. If sectoral outlays are conditioned by stock-flow ratios, the trend-exponential significance of the determination of income distribution motivated by this paper hinges on whether the equilibrium or target values for these ratios are subject to long-run changes. While that is an empirical question requiring separate examination, figure one suggests the US inventory-to-sales ratio for the manufacturing and trade sectors is not stationary, at least over the recent 20-year period. Similarly, as emphasised by Nikiforos (2012), the average working week of capital equipment in US manufacturing (which constitutes a broad measure of capacity utilisation) also appears to follow a non-stationary evolution. This suggests the aggregate sales to total capital ratio is susceptible to long-term changes. In the Circuit of Capital, such variations in the relative measure of the stock of capital value correspond to variations in the circuit's *turnover time*, which directly influences aggregate profitability and, as shown above, the realised distribution of income. It is thus pertinent to consider the points above as they apply to exponential-trend evolutions.

6. **Comparative Exponential Trends**

Consider any given dynamic model of the Circuit of Capital exhibiting a real-exponential trend mode of evolution, in which the rate of growth is a continuous, differentiable function $g = g[\vec{x}]$ of the parameters of the system of equations describing the economy. Under any given normalisation, the extensive evolution of any stock or flow will be given by,[25]

$$Y_t = Y_0\left[\vec{x}, g[\vec{x}]\right] e^{g[\vec{x}]t} \tag{41}$$

In this setting, any weighted ratio between flows and stocks, such as the distribution of income or the rate of profit, may be understood as a function of the parameters and the rate of growth,

$$A\left[\vec{x}, g[\vec{x}]\right] = \Phi\left[\vec{x}\right] \frac{Y_0^i\left[\vec{x}, g[\vec{x}]\right]}{Y_0^j\left[\vec{x}, g[\vec{x}]\right]} \tag{42}$$

With minimal loss of generality, consider a ratio where the autonomous term is itself a parameter, independent of all others, such as the distribution of income, for constant rates of exploitation.

$$H\left[\vec{x}, g[\vec{x}]\right] = \varepsilon \frac{R_0\left[\vec{x}, g[\vec{x}]\right]}{Z_0\left[\vec{x}, g[\vec{x}]\right]} \tag{43}$$

The points developed in previous sections may may be restated and generalised on the basis of this identification. Both the trend rate of growth and any ratio like (42), including the aggregate distribution of income, are taken as endogenous to the parameters. Any comparative-dynamic change in the parameters will independently condition the growth rate and income distribution. In order to consider the consequent confounded association between both variables it is necessary to characterise the impact of parameter changes on this measure of aggregate distribution.

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[25] The explicit dependence of the trend exponential rate of growth is warranted for three reasons. First, under real exponential evolutions the rate of growth will appear in ratios between initial conditions whenever some variables depend directly on past variables. This is the case with stocks as well as any flows subject to lagged dependences on past flows. Second, it may not be possible to express explicitly the rate of growth as a function of parameters, as under even simple settings, the equations defining these relationships may involve transcendental functions, high-degree polynomials, or other nonlinearities. In such cases comparative-dynamic exercises may be pursued with the help of the Implicit Function Theorem. And third, these explicit dependences are necessary to consider the determinants of distribution and growth rates.

Consider a movement along a parameter x_i, which changes distribution according to,

$$\frac{dH\left[\vec{x},g[\vec{x}]\right]}{dx_i} = H_i\left[\vec{x},g[\vec{x}]\right] + \frac{dg\left[\vec{x}\right]}{dx_i} H_g\left[\vec{x},g[\vec{x}]\right] \tag{44}$$

Where the subscript i on any variable denotes its partial derivative with respect to x_i. This may be expressed in relation to elasticities,

$$\eta_i^H = \varepsilon\left\{\left(\eta_i^{R_0} - \eta_i^{Z_0}\right) + \eta_i^g\left(\eta_g^{R_0} - \eta_g^{Z_0}\right)\right\} \tag{45}$$

The first difference in (45) captures the static or contemporaneous effects of parameter changes on distribution, and is the broadest foundation for all the results motivated so far. The second difference captures a further, dynamic element in the reaction of income distribution. Inasmuch as parameter changes alter the steady-state rate of growth, any differences in the measure to which capital outlays and aggregate sales depend respectively on past flows will give rise to additional dynamic effects changing the distribution of income. Significantly, it is possible that exogenous shifts will have contemporaneous, static effects that are offset or reversed by their dynamic impact on capital outlays and sales via the rate of growth. This may be an additional source of counterintuitive or seemingly paradoxical dynamic effects along the lines discussed above.

It is now possible to turn to the confounded relationship between growth and aggregate income distribution for any arbitrary exogenous change to a model's parameters. Consider a movement along a (normalised) direction $\vec{\delta} = \left[\delta_1,\delta_2,...,\delta_n\right]$ in parameter space, corresponding to proportional parameter changes $\vec{\gamma}\left[\gamma_1,\gamma_2,...,\gamma_n\right]$. The confounded association between distribution and growth will be given by the total derivative of distribution along direction $\vec{\delta}$, divided by the same directional derivative for the rate of growth,

$$\left.\frac{dH\left[\vec{x},g[\vec{x}]\right]}{dg}\right|_{\vec{\delta}} = \frac{\vec{\delta}.\vec{\nabla}H\left[\vec{x},g[\vec{x}]\right]}{\vec{\delta}.\vec{\nabla}g\left[\vec{x}\right]} \tag{46}$$

This is more intuitively expressed as a relationship on the directional elasticity of distribution,

$$\eta_g^H\Big|_{\vec{\delta}} = \left(\eta_g^{R_0} - \eta_g^{Z_0}\right) + \frac{\sum\left(\eta_i^{R_0} - \eta_i^{Z_0}\right)\gamma_i}{\sum \eta_i^g \gamma_i} \tag{47}$$

Any observed association between distribution and growth in the present context arises from the balance of the distinct influences of parameter shifts on capital outlays and on aggregate demand. These include dynamic effects arising from the impact of parameter shifts on the rate of growth. It should be evident that different parameter-change vectors will result in a different confounded elasticity. There is no single relationship between distribution and growth in any given economy.

While the directional elasticity in (47) does not reflect a causal association between the aggregate distribution of income and the economy's rate of growth, it does provide the basis for specific statements considering the association between the two measures along any comparative dynamic movement in a given direction in parameter space. Some directions in parameter space my yield positive comparative-dynamic associations between profit shares and the rate of growth, while others may yield negative ones. The appendix to this paper offers a dynamic generalisation of the example of different "credit allocations" in section four by way of illustration of these points.

A final set of points may be made in relation to the aggregate profitability of capital along trend-exponential evolutions. This is measured by the ratio of profit flows to the stock of capital value,

$$\rho\left[\vec{x}, g[\vec{x}]\right] \equiv \frac{qR_0\left[\vec{x}, g[\vec{x}]\right]}{K_0\left[\vec{x}, g[\vec{x}]\right]} = qg[\vec{x}]\left\{\frac{R_0\left[\vec{x}, g[\vec{x}]\right]}{Z_0\left[\vec{x}, g[\vec{x}]\right] - R_0\left[\vec{x}, g[\vec{x}]\right]}\right\} = \kappa g[\vec{x}]\left\{\frac{H\left[\vec{x}, g[\vec{x}]\right]}{1 - \varepsilon^{-1} H\left[\vec{x}, g[\vec{x}]\right]}\right\} \tag{48}$$

Three points are evident from this expression. First, along parameter vectors yielding positive, confounded associations between profit shares and growth, the association between profit shares and the rate of profit is positive. Second, along parameter vectors yielding negative associations between profit shares and growth, falls in profit shares may be associated with higher measures of profitability. This simply requires the increase in the relative measure of capital outlays vis-a-vis aggregate sales to be accompanied by an increase in the trend-exponential rate of growth that is sufficiently strong to outweigh the corresponding increase in the stock of capital. Third and finally,

the rate of utilisation of productive capacity does not in itself change the comparative measure of the aggregate stock of capital. As such, it does not by itself alter profitability. It will only exhibit a positive comparative association with profitability when accompanied by comparative increases in aggregate demand, as is implicitly the case in neo-Kaleckian frameworks.

7. A Brief Concluding Summary

The exercises and discussion offered above may be boiled down to a few, bottom-line analytical and policy takeaways. Analytically, once the dependence of wages on capital outlays is deliberately considered, all versions of the "paradox of cost" and "wage-led growth" have been shown to have no analytical purchase. The functional or class distribution of income is jointly conditioned with output (or growth rate) by the relationship between productive and consumption commitments. As a result, it is spurious to contend that distribution may exert a *causal* influence on the level of output or the rate of growth. More broadly, the role played by the consumption behaviour of wage earners in conditioning the association between the real wage and output was shown to be fundamentally different from, and oft exactly opposite to the role foreseen by neo-Kaleckian contributions. These difficulties were shown to apply in short-run, comparative static settings; in transient or cyclical evolutions; and, if sectoral assets-to-income ratios are subject to long-term variability, to the exponential-trends of any given dynamic evolution.

The approach to the class or functional distribution of income developed by this paper yields an alternative taxonomy for demand regimes and their impact on growth and distribution. Recent policy developments in economies like the US and Britain (and more recently middle-income economies like Brazil), have pursued what may be termed "consumption-led growth", in which demand growth has been driven by growth in consumption. As shown by this paper, such strategies contribute to rising profit shares quite apart from changes to real wages or labour-to-output ratios. More equitable outcomes may arise from converse, "investment-led growth" strategies, in which growing scales of capital outlays disproportionately drive growth in aggregate demand.

In addition to firmer analytical foundations, this dichotomy points to fundamentally different policy agendas than arguments for "wage-led growth". It suggests consideration of the imperatives and institutional settings that may ensure sustained rates of growth in capital outlays, including in settings of stable or rising real wages. This points not to questions of income distribution, but to

the relative merits of individual profitability and public or social impact as the criteria informing social choices concerning which productive enterprises should be undertaken.

Finally, the discussion above points to two pertinent areas of further work. First, it motivates the significance of empirical investigations concerning the short- and long-term behaviour of asset-to-income ratios for enterprises, wage-earners, and capitalist households. Second, it suggests dynamic models along the lines of (35), (36) and (37) may yield new insights into the cyclical and transient behaviour of distribution, profitability, and growth. It is hoped that together with further work along such lines, this paper helps motivate a reassessment of the relationship between consumption, distribution and growth among hitherto proponents of "wage-led growth". Such reassessment will result in more robust arguments for macroeconomic interventions supporting the high-growth, high-wage-share evolutions sought by most heterodox economists, and may thus help broaden the presently narrow scopes of current macroeconomic debates.

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Appendix

Consider a dynamic generalisation of the exercise undertaken in section four. Suppose the system in question includes two parameters, λ and υ, which directly boost capital outlays and consumption by workers respectively. In any demand-constrained framework, both parameters will boost the steady-state rate of exponential growth. Application of (41) shows that an increase in λ will increase the wage share while supporting a growth acceleration when,

$$\eta_{\lambda}^{g}\left(\eta_{g}^{Z_0}-\eta_{g}^{R_0}\right)>\left(\eta_{\lambda}^{R_0}-\eta_{\lambda}^{Z_0}\right) \tag{A1}$$

Conversely, an increase in υ will result in profit-share increases during an acceleration if,

$$\eta_{\upsilon}^{g}\left(\eta_{g}^{R_0}-\eta_{g}^{Z_0}\right)>\left(\eta_{\upsilon}^{Z_0}-\eta_{\upsilon}^{R_0}\right) \tag{A2}$$

Inequalities (A1) and (A2) are dynamic generalisations of conditions (27) and (29).[26] The net effect on the income distribution of either type of credit will depend on the relative, contemporaneous effect it has on capital outlays relative to sales. It will also depend, inasmuch as the determinations of capital outlays and sales are subject to time lags, on the dynamic effect greater lending has on the rate of growth. The conditions ensuring both inequalities hold may be broadly motivated.

In considering (A1), suppose the steady-state solutions to the system are normalised to the level of capital outlays, ensuring its elasticities are zero and that sales are measured relative to it. Inasmuch as sales follow with some time lags from capital outlays, the left-hand side of that inequality will be positive, as greater growth reduces sales relative to contemporaneous capital outlays. Condition (A1) will only fail to hold if production credit leads to increases in sales relative to capital outlays, and if the resulting elasticity is sufficiently large to outweigh dynamic effects arising from lags in sales relative to capital outlays. Conversely, consider (A2) while normalising solutions to the level of sales. As above, the left hand side of the inequality will be positive as long as capital outlays have some dependence on lagged values of sales. The condition will only fail to hold if consumption credit has a positive impact on capital outlays relative to sales, and that impact is sufficiently large to outweigh dynamic effects reducing capital outlays relative to sales.

Given the strength of these requirements, one should expect to find many dynamic specifications under which both (A1) and (A2) hold. In those cases, production credit effects wage-share boosting accelerations, while consumption credit would effect profit-boosting growth accelerations.

[26] In the absence of dynamic effects, the left-hand sides of (37) and (38) become zero, and the inequalities effectively resolve into statements of (27) and (29), which can be seen easily if the normalisations pursued below are followed.

Figure 1 | US Manufacturing and Trade Inventories To Sales Ratio
January 1992 - January 2013, Source: US Census Bureau

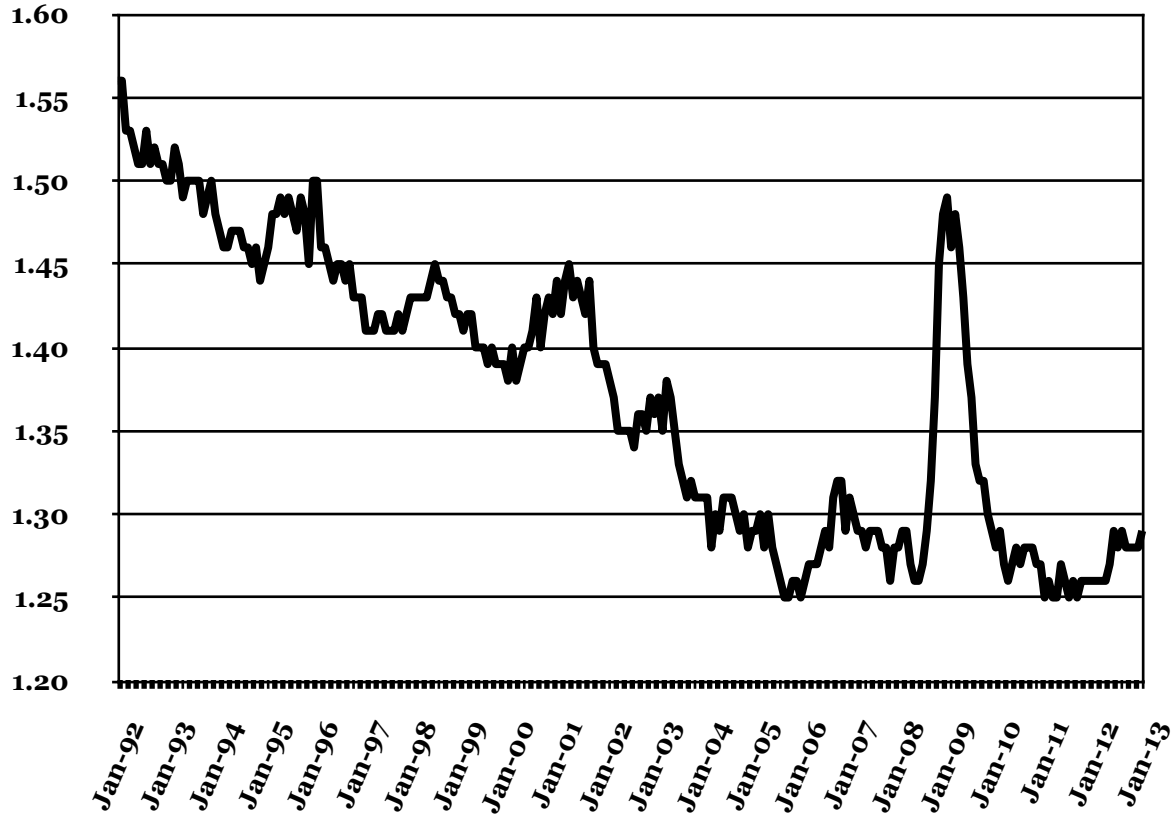
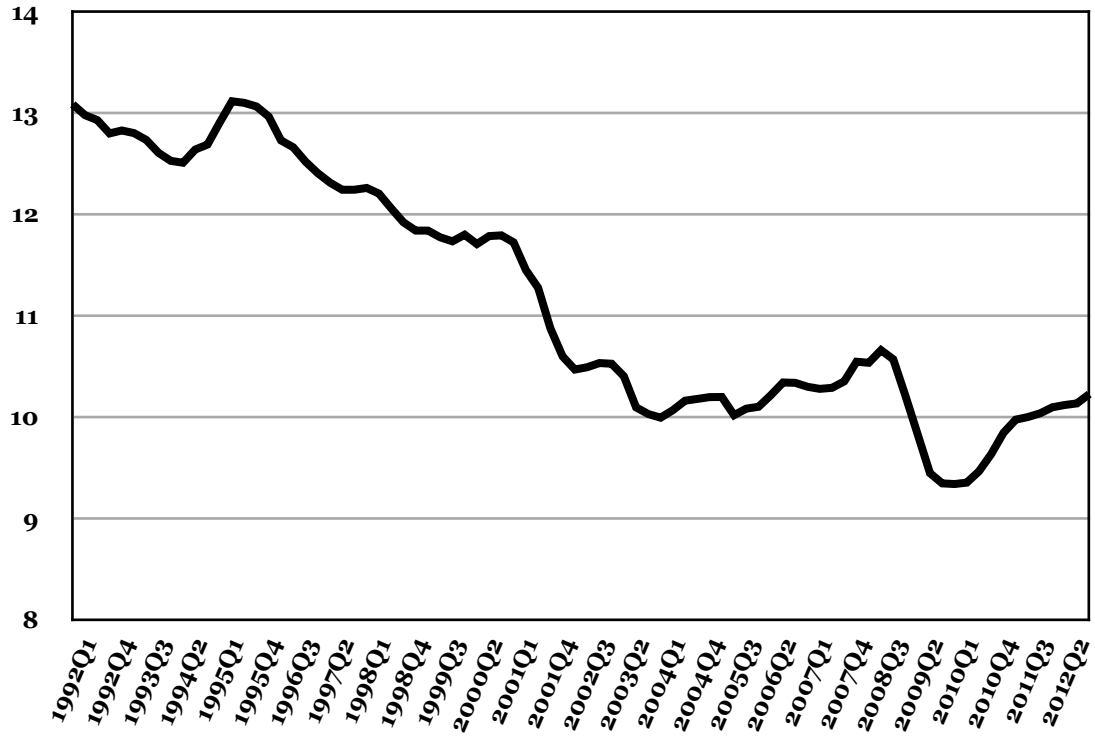


Figure 2 | US Manufacturing and Trade Inventories To GDP
1992Q1 - 2012Q4, Calculated from BEA and US Census Bureau Data[27]



[27] Census Bureau monthly data on inventories is averaged over the relevant quarter.