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Abstract:

This paper sets forth a Neo-Kaleckian model of capacity utilization and growth with distribution featuring a profit-sharing arrangement. While a given proportion of firms compensate workers with only a base wage, the remaining proportion do so with a base wage and a share of profits. Consistent with the empirical evidence, workers hired by profit-sharing firms have a higher productivity than their counterparts in base-wage firms. While a higher profit-sharing coefficient raises capacity utilization and growth irrespective of the distribution of compensation strategies across firms, a higher frequency of profit-sharing firms does likewise only if the profit-sharing coefficient is sufficiently high.

Keywords: profit sharing, productivity, capacity utilization, growth

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1. Introduction

Weitzman's (1984, 1985) contention that profit sharing is able to bring about full employment and low inflation has not led to its extensive use, yet alternative employee compensation mechanisms have become more common since the 1980s (D'Art and Turner, 2004; Dube and Freeman, 2008). Weitzman claimed that while a wage economy is prone to unemployment in the short run, a profit-sharing economy rather experiences excess demand for labor. The reason is that, if some part of workers' total compensation is received as a profit share and if, as a result, the base wage is lower than otherwise, firms face a lower marginal cost of labor. Profit-maximizing monopolistically competitive firms will then be willing to hire more workers and given a sufficient degree of profit sharing, an excess demand for labor results. As the marked up price is lower than in a wage economy, a resulting real balance effect leads to a higher aggregate demand and hence to a higher desired output.[2]

Weitzman's propositions about the macroeconomic benefits of profit sharing were promptly criticized by economists of different persuasions, and a common heterodox criticism is that Weitzman ignored effective demand issues and implicitly assumed that unemployment is caused by downward wage inflexibility (see e.g., Davidson, 1986-87; Rothschild, 1986-87). Although well taken, this criticism does

[1] This revised version was produced while I was visiting the Economics Department of the University of Massachusetts Amherst, whose hospitality is gratefully acknowledged. It has benefitted from useful comments by two anonymous referees and the guest editor of this special issue of *Metroeconomica*, Amitava Krishna Dutt, though any remaining errors are my own. Research funding received from the Brazilian Coordination for the Improvement of Higher Level Personnel (CAPES) and the Brazilian National Council of Scientific and Technological Development (CNPq) is likewise gratefully acknowledged.

[2] Profit-sharing arrangements vary considerably, and some major ways in which they differ concern what is actually shared (e.g., total profits or profits above a certain target), how and when compensation is made (e.g., in cash or company stocks, in a deferred or non-deferred way) and to whom compensation is made (e.g., directly to workers or to some workers' retirement plan).

not imply that profit sharing *per se* should necessarily be dismissed, and this paper develops a short-run Neo-Kaleckian model of capacity utilization and growth, in which income distribution features profit sharing. As distribution plays a prominent role in the Kaleckian approach, it is only natural to investigate the potential benefits of profit sharing for macroeconomic performance in a model conforming to central tenets of that approach.

The empirical literature on profit sharing finds that its adoption usually raises labor productivity.[3] Although the estimated size of the productivity gain varies from case to case, it is usually non-negligible. Meanwhile, the empirical evidence for the proposition that profit sharing leads to stronger employment performance is more mixed. Weitzman and Kruse (1990) examine sixteen studies showing that profit sharing raises productivity and find that only 6 percent of the 218 estimated profit-sharing coefficients are negative (and none significantly so), while 60 percent of them are significantly positive. Conyon and Freeman (2004), using UK data, find that firms that adopt profit-related pay tend to outperform other firms in productivity and financial performance, a resulted also obtained by Cahuc and Dormont (1997) using data for France. Kim (1998), meanwhile, using US data, finds that though profit sharing raises productivity, this does not translate into higher profits, as gains from profit sharing are cancelled out by increased labor costs. Nevertheless, D'Art and Turner (2004), using data for 11 European countries, find that the relationship between profit sharing and firms' financial performance is statistically and strongly significant. Meanwhile Dube and Freeman (2008), using US data, find that profit sharing has a statistically significant effect on labor productivity when accompanied by shared modes of decision-making.

As the empirical evidence reveals that profit sharing became more common but not universal, this paper extends a setup developed in Lima (2010) to consider that firms behave heterogeneously as regards the choice of workers' compensation strategy. While some firms choose to compensate workers with only a base wage (non-sharing strategy), the remaining firms opt to offer profit sharing on top of such

[3] Two reasons offered in the literature for the productivity-enhancing effect of profit sharing are its inducement of higher worker's effort level and its reduction of labor turnover.

a base wage (profit-sharing strategy).[4] In line with the empirical evidence, workers hired by profit-sharing firms have a higher productivity than their counterparts in base-wage firms.[5] An interesting question that arises (*inter alia*) is how does an exogenous change in the frequency distribution of compensation strategies in the population of firms affect average capacity utilization, employment and growth.

The remainder of this paper is organized as follows. Section 2 describes the structure of the model. Meanwhile, Section 3 solves for the short-run equilibrium values of average capacity utilization and growth, and then derives and discusses comparative-statics results. The closing section summarizes the main conclusions reached along the way.

2. Structure of the model

The economy is a closed one and with no government activities, producing a single good for both investment and consumption. Production is carried out by a population of h imperfectly-competitive firms, which combine capital and labor through a fixed-coefficient technology. Firms produce (and hire labor) according to effective demand, which is assumed to be insufficient for any of them to produce at full capacity utilization at prevailing prices. Two technologies are available: though they have the same capital coefficient, one of them has a lower labor coefficient. The technological choice of a given firm is, however, conditioned by its choice of workers' compensation strategy, of which there are two ($i = n, s$): a firm can either pay workers only a base wage (non-sharing strategy, n) or pay them a base wage and a share of profits (profit-sharing strategy, s). Firms playing the profit-sharing strategy gain access to the technology with the lowest labor coefficient. As the base wage rate is the same under both strategies, any worker hired by a sharing firm receives a higher (average) total compensation than a worker hired by a non-

[4] This paper does not set forth a formal theory explaining why firms behaviorally limit themselves to these two compensation strategies only; arguably, though, the analysis conducted here can be seen as necessary anyway as a preliminary step toward dealing with such a larger issue.

[5] In addition to this major structural difference given by the consideration of heterogeneous behavior by firms, the building blocks of the present model also differ from those used in Lima (2010) by privileging a Neo-Kaleckian specification, given the theme of this special issue of this journal. In Lima (2010), for instance, several different specifications of the investment and consumption functions are considered, including one in which workers save some of the compensation they receive as shared profits.

sharing firm along the economically meaningful domain given by strictly positive profits for any existing sharing firm. The inverse of the labor coefficient of the j-th firm is given by:

$$a_i = X_j / L_j \quad [1]$$

for all $j = 1, 2, ..., h_i$, where a_i denotes the labor productivity corresponding to each workers' compensation strategy, X_j is the individual output level and L_j is the individual employment level. It then follows that $a_s = X_j / L_j$ for all $j = 1, 2, ..., h_s$ and $a_n = X_j / L_j$ for all $j = 1, 2, ..., h_n$, with $a_s > a_n$.

We assume that firms that choose the same compensation strategy produce the same amount of output (and hence hire the same amount of workers) and also charge the same price. More precisely, if we let h_i denote the number of firms that adopted compensation strategy i and let X_i denote the total amount of output produced by firms that adopted compensation strategy i, it follows that:

$$x_j = X_i / h_i \quad [2]$$

for all $j = 1, 2, ..., h_i$, where x_i denotes the individual output corresponding to each workers' compensation strategy. It then follows that $x_j = X_s / h_s$ for all $j = 1, 2, ..., h_s$ and $x_j = X_n / h_n$ for all $j = 1, 2, ..., h_n$.

Having chosen a given compensation strategy, a firm makes a take-it-or-leave-it offer to available workers to hire as many workers it needs to produce its demand-determined level of output. Nonetheless, the hired workers deliver the labor effort ensuring that their productivity is equal to the expected one by firms when they decided what compensation strategy to offer. As a result, workers have a higher productivity if the hiring firm pay they them a base wage and a share of profits, which is the entire surplus over the corresponding base wage.

The aggregate capital stock, K, is assumed to be uniformly distributed across firms. Denoting by K_s and K_n the amounts of capital operated by sharing and non-sharing firms, respectively, it follows that $K / h = K_s / h_s = K_n / h_n$. The rate of capacity utilization of each subpopulation of firms is then given by:

$$u_s = X_s / K_s \quad [3]$$

and

$$u_n = X_n / K_n \quad [4]$$

Therefore, average capacity utilization, $u = X / K$, is given by:

$$u = \frac{X}{K} = \frac{X_s + X_n}{K} = \frac{K_s}{K}\frac{X_s}{K_s} + \frac{K_n}{K}\frac{X_n}{K_n} = \lambda u_s + (1-\lambda)u_n \quad [5]$$

where λ is the proportion of firms adopting the sharing strategy, $(h_s / h) = (K_s / K)$, and hence $(1-\lambda)$ is the proportion of firms adopting the non-sharing strategy, $(h_n / h) = (K_n / K)$. As the capital stock is uniformly distributed across firms, λ also denotes the proportion of the capital stock operated by firms adopting the sharing strategy and hence $(1-\lambda)$ also denotes the proportion of the capital stock operated by firms adopting the non-sharing strategy.

In setting their price, firms follow markup-pricing:

$$P_i = \frac{z_i w}{a_i} \quad [6]$$

where $z_i > 1$ is the markup factor (one plus the markup) applied by firms adopting compensation strategy i, while w is the (uniform) nominal base wage. As we assume that the productivity differential between the two strategies is given by $a_s / a_n = \alpha > 1$, and for simplicity we further assume that $a_n = 1$, so that $a_s = \alpha$, the corresponding individual prices are given by:

$$P_s = \frac{z_s w}{\alpha} \quad [7]$$

and

$$P_n = z_n w \quad [8]$$

Having chosen to follow a profit-sharing strategy, a firm has to further decide how it will use the resulting productivity differential. We assume that a sharing firm uses its productivity differential to apply a markup factor which is proportionately higher than that applied by non-sharing firms, $z_s / z_n = \alpha > 1$, while charging the same price, $P_s = P_n$ (and hence without compromising its ability to sell as much output as non-sharing firms, as detailed later).[6]

We compute the average price level as the following weighted average:

$$P = P_s^{\lambda} P_n^{1-\lambda} \quad [9]$$

Yet since all firms charge the same price the average price level is given by:

$$P = P_s = P_n \quad [10]$$

The nominal profits of the subpopulation of sharing firms are given by:

$$\Pi_s = P_s X_s - wL_s \quad [11]$$

As the average price level is given by [10], the real profits of the subpopulation of sharing firms are given by:

$$\frac{\Pi_s}{P} = R_s = X_s - vL_s = (1 - v\alpha^{-1}) X_s \quad [12]$$

where v is the real base wage. Meanwhile, the nominal profits of the subpopulation of non-sharing firms are given by:

$$\Pi_n = P_n X_n - wL_n \quad [13]$$

The real profits of the subpopulation of non-sharing firms are then given by:

$$\frac{\Pi_n}{P} = R_n = X_n - vL_n = (1 - v) X_n \quad [14]$$

Normalizing the real profits of the two subpopulations of firms by the capital stock, we have:

$$\frac{R_s}{K} = (1 - v\alpha^{-1}) \frac{X_s}{K} = (1 - v\alpha^{-1}) \frac{K_s}{K} \frac{X_s}{K_s} = \lambda (1 - v\alpha^{-1}) u_s \quad [15]$$

and

[6] Another alternative would be for a sharing firm to charge a price proportionately lower than that charged by non-sharing firms, while applying the same markup. Yet another possibility would be for a sharing firm to use the productivity differential to both raise its markup and improve its price competitiveness, though less than proportionately in either case. Also, we could assume that not all sharing firms make the same decision about how to use the productivity differential, but we assume that they behave alike in that respect. To keep focus, we leave for future work the exploration of these alternative specifications.

$$\frac{R_n}{K} = (1-v)\frac{X_n}{K} = (1-v)\frac{K_n}{K}\frac{X_n}{K_n} = (1-\lambda)(1-v)u_n \qquad [16]$$

Denoting by $\pi_s = (1-v\alpha^{-1})$ the proportion of (gross) profits in the output of sharing firms (as explained later, it is gross profits since a fraction of them is shared with workers) and by $\pi_n = (1-v)$ the proportion of profits in the output of non-sharing firms, we can re-write the above expressions as:

$$\frac{R_s}{K} = \lambda \pi_s u_s \qquad [15']$$

and

$$\frac{R_n}{K} = (1-\lambda)\pi_n u_n \qquad [16']$$

As a result, it follows that $\pi_s / \pi_n = (1-v\alpha^{-1})/(1-v) > 1$. Intuitively, the productivity differential implies a profit share differential if sharing firms use it to raise their markup proportionately, while charging the same price as non-sharing firms. Meanwhile, the average general rate of profit, R/K, is given by:

$$r = \frac{R}{K} = \lambda \pi_s u_s + (1-\lambda)\pi_n u_n = \lambda r_s + (1-\lambda) r_n \qquad [17]$$

where r_s is the (gross) profit rate of sharing firms and r_n is the profit rate of non-sharing firms.

The economy is inhabited by two classes, capitalists who own the firms and workers. Workers, who are always in excess supply, provide labor and earn a base wage, if they work for non-sharing firms, while workers hired by sharing firms also receive a share of profits. In terms of the alternative sharing schema described in footnote 1, we assume that what it is shared is total profits and that compensation is made in cash, in a non-deferred way and directly to workers. We also assume that while workers' total compensation is all spent on consumption, capitalists save a fraction of their respective profit income.

The division of real income from production by sharing firms is given by:

$$X_s = vL_s + \delta R_s + (1-\delta)R_s \qquad [18]$$

where $0<\delta<1$ is the profit-sharing coefficient. Workers' total compensation in income from production by sharing firms, σ_s, can be expressed as:

$$\sigma_s = \frac{vL_s + \delta R_s}{X_s} = (1-\delta)v\alpha^{-1} + \delta \quad [19]$$

Hence sharing capitalists' compensation as a proportion of the income from their own production is given by:

$$\pi_s^c = (1-\delta)\pi_s = (1-\delta)(1-v\alpha^{-1}) \quad [20]$$

where $\pi_s = 1 - v\alpha^{-1}$, as defined above, is the proportion of (gross) profits in the output of sharing firms. Meanwhile, division of the income from production by non-sharing firms is given by:

$$X_n = vL_n + R_n \quad [21]$$

Workers' compensation in income from production by non-sharing firms, σ_n, can be expressed as:

$$\sigma_n = \frac{vL_n}{X_n} = v \quad [22]$$

Hence non-sharing capitalists' compensation as a proportion of the income from their own production, as defined above, is given by:

$$\pi_n = 1 - v \quad [23]$$

As a result, workers' total compensation as a proportion of aggregate income, σ, which is equivalent to the average workers' share in income, can be expressed as:

$$\sigma = \frac{v(L_s + L_n) + \delta R_s}{X} = [\lambda \sigma_s u_s + (1-\lambda)\sigma_n u_n]/u \quad [24]$$

Meanwhile, capitalists' total compensation as a fraction of aggregate income, π, which is equivalent to the average capitalists' share in income, is given by:

$$\pi = \frac{(1-\delta)R_s + R_n}{X} = [\lambda \pi_s^c u_s + (1-\lambda)\pi_n u_n]/u \quad [25]$$

Yet we assumed that the productivity differential granted by adopting profit sharing is used by sharing firms to raise their markup factor. This is tantamount to assuming that the distribution of aggregate effective demand across strategies is governed by the following rule:

$$u_s / u_n = P_n / P_s \qquad [26]$$

We are assuming that individual nominal demand (or individual nominal revenue) ($P_i X_i / h_i$), which is the same for all firms adopting a given strategy, is also equalized across strategies ($P_s X_s / h_s = P_n X_n / h_n$). We can use [5], [10] and [26] to re-write [24] and [25] as follows:

$$\sigma = \lambda\sigma_s + (1-\lambda)\sigma_n \qquad [24']$$

and

$$\pi = \lambda\pi_s^c + (1-\lambda)\pi_n \qquad [25']$$

Recall that workers' total compensation is all spent on consumption, while capitalists save a common fraction, $0 < s < 1$, of their (net) profit income. Aggregate saving, S, is then given by:

$$S = s\left[(1-\delta)R_s + R_n\right] \qquad [27]$$

Substituting from [15] and [16] and recalling that [5], [10] and [26] imply that $u_s = u_n = u$, aggregate saving as a proportion of the capital stock, g^s, and hence average saving, can be expressed as:

$$g^s = s[\lambda(1-\delta)(1-v\alpha^{-1}) + (1-\lambda)(1-v)]u \qquad [28]$$

We assume that firms behave similarly as regards desired investment, with firms playing the same compensation strategy behaving alike (so that I_s^d / h_s is equal for all $j = 1, 2, ..., h_s$ and I_n^d / h_n is equal for all $j = 1, 2, ..., h_n$). Total desired investment by firms playing each compensation strategy, I_s^d and I_n^d, as a proportion of the aggregate capital stock, g_s^d and g_n^d, respectively, is given by:

$$g_s^d = \frac{I_s^d}{K} = \frac{\beta_0}{2} + \beta_1 \frac{(1-\delta)R_s}{K} + \beta_2 \frac{X_s}{K} \qquad [29]$$

and

$$g_n^d = \frac{I_n^d}{K} = \frac{\beta_0}{2} + \beta_1 \frac{R_n}{K} + \beta_2 \frac{X_n}{K} \qquad [30]$$

where β_0, β_1 and β_2 are positive parameters. As it turns out, aggregate desired investment as a proportion of the aggregate capital stock, g^d, which is equal to the average desired capital accumulation, is given by:

$$g^d = g_s^d + g_n^d = \beta_0 + \beta_1 \left[\frac{(1-\delta)R_s + R_n}{K} \right] + \beta_2 \left[\frac{X_s + X_n}{K} \right] \qquad [31]$$

Substituting from [5], [15], [16] and (along with $P_s = P_n$) [26], we obtain the following expression for the average desired rate of capital accumulation:

$$g^d = \beta_0 + \{\beta_1[\lambda(1-\delta)(1-v\alpha^{-1}) + (1-\lambda)(1-v)] + \beta_2\}u \qquad [32]$$

We follow Rowthorn (1981) and Dutt (1984), who in turn follow Kalecki (1971) and Robinson (1962), in taking (average) the desired capital accumulation rate to depend positively on the (average) current profit rate. The rationale is that the (average) current profit rate is an index of (average) expected future earnings and also both provides internal funding for investment and makes it easier for firms to obtain external funding. As in this model a fraction of aggregate profit income goes to workers as shared profits, though, it is more reasonable to make (average) desired capital accumulation to depend on the component of the (average) general rate of profit (given by [17]) corresponding to profits remaining with capitalists (note that the net rate of profit of sharing firms is given by $r_s^c = (1-\delta)r_s$). We also follow Rowthorn (1981) and Dutt (1984), who in turn now follow Steindl (1952), in assuming that (average) desired capital accumulation depends positively on the (average) rate of capacity utilization due to accelerator-type effects.[7]

3. Behavior of the model in the short run

We define the short run as a time frame in which the capital stock, K, the labor supply, N, the output-labor ratios, a_s and a_n, the markup factors, z_s and z_n,

[7] Alternatively, following Kalecki (1935) and Robinson (1962), we could assume that it is the expected profit rate that matters for desired investment, so that [29]-[31] would feature the expected capitalists' rates of profit instead. Hence the specification in [29]-[31] can be seen as making the implicit assumption (often made by Kalecki and Robinson themselves) of static profit expectations, with expected values proxied by current ones.

the nominal base wage, w (and consequently the price level, P), the profit-sharing coefficient, δ, and the distribution of compensation strategies across firms, λ, can all be taken as given (recall that the population of firms, h, is fixed). The existence of excess (aggregate and individual) capital capacity implies that (aggregate and subpopulational) output (X, X_s and X_n) will adjust to remove any excess demand or supply in the economy, so that in short-run equilibrium, aggregate saving, S, is equal to aggregate desired investment, I. As a proportion of the capital stock, this goods market equilibrium condition can be expressed as:

$$g^s = \frac{S}{K} = g^d = \frac{I}{K} \qquad [33]$$

We can solve for the short-run equilibrium value of average capacity utilization by substituting [28] and [32] in [33], which yields:

$$u^* = \frac{\beta_0}{(s-\beta_1)[\lambda(1-\delta)(1-v\alpha^{-1}) + (1-\lambda)(1-v)] - \beta_2} \qquad [34]$$

Given the demand-driven nature of this model, we assume an adjustment mechanism stating that average capacity utilization varies positively with average excess demand in the goods market. This means that u^* will be positive and stable provided that average saving is more responsive than average desired capital accumulation to changes in average capacity utilization, which in turn requires that the denominator of u^* is positive. Note that the pricing equations [7] and [8] imply meaningful values for the subpopulational profit shares given by $0 < \pi_i = R_i / X_i < 1$, which according to the derivation leading to [15'] and [16'] requires that $0 < v < 1$, while we assumed that $\alpha > 1$, $0 < \delta < 1$ and $0 < \lambda < 1$. Hence $s > \beta_1$ is a necessary condition for the equilibrium value of the short-run average capacity utilization to be positive and stable, and we will see below that it also plays a significant role in the derivation of several comparative-statics results.

Indeed, a first issue worth addressing is the impact of changes in the real base wage on average capacity utilization, which is given by:

$$u_v^* = \frac{(s-\beta_1)[\lambda(1-\delta)\alpha^{-1} + (1-\lambda)]\beta_0}{D^2} > 0 \qquad [35]$$

where D is the denominator in the expression in [34]. Hence a rise in the real base wage, which translates into a rise in the share of workers' total compensation in income (as shown by [24'] in conjunction with [19] and [22]), leads to an increase in average capacity utilization. As in the canonical Neo-Kaleckian model developed independently by Rowthorn (1981) and Dutt (1984) (which does not feature profit sharing), a rise in the real base wage, by redistributing income from capitalists who save to workers who do not, makes for a rise in (average) consumption demand, raises (average) investment demand through the accelerator effect, and hence boosts the (average) level of economic activity. Furthermore, as the size and distribution of the capital stock across compensation strategies and the average labor productivity are both given, such a rise in average capacity utilization (and therefore in average and aggregate output) is accompanied by an increase in aggregate employment (and hence, as the aggregate labor supply is given, in the rate of employment as well). We can use [1], [3]-[4] and [34] to express the short-run equilibrium level of aggregate employment, L^*, as:

$$L^* = [\lambda\alpha^{-1} + (1-\lambda)]u^* K = \frac{u^* K}{a} \qquad [36]$$

where a is the average labor productivity. This expansionary effect of a higher real base wage contrasts with Weitzman's (1984, 1985) main proposition that a fall in the marginal cost of labor (which is claimed to be effectively brought about by the introduction of a profit-sharing mechanism) is a precondition for a rise in output and employment. In Weitzman's approach a fall in the marginal cost of labor is a necessary condition for firms to hire more workers and for a fall in the price level to generate the real balance effects through which aggregate demand will increase to allow firms to sell their increased output. In the model developed here, meanwhile, an independent and heterogeneous investment behavior figures prominently in the determination of aggregate demand. Although investment behavior is independent from savings, it is nonetheless dependent on the distribution of income not only between capitalists and workers, but between profit-sharing and non-profit-sharing capitalists as well.[8]

[8] The wage-led expansion derived above replicates the main result of the canonical Neo-Kaleckian model, and hence does not come from the introduction of profit sharing *per se* (though a rise in the real (base) wage now exerts both a positive and a negative impact on

Meanwhile, a rise in the real base wage will likewise lead to an increase in the short-run equilibrium average growth rate, g^*, as shown by substituting [34] in either [28] or [32] and then computing the corresponding comparative statics:

$$g^* = \frac{s\beta_0[\lambda(1-\delta)(1-v\alpha^{-1})+(1-\lambda)(1-v)]}{(s-\beta_1)[\lambda(1-\delta)(1-v\alpha^{-1})+(1-\lambda)(1-v)]-\beta_2} \qquad [37]$$

and

$$g_v^* = \frac{[g^* - s\beta_0/(s-\beta_1)][\lambda(1-\delta)\alpha^{-1}+(1-\lambda)]}{D^2} \qquad [38]$$

where D is again the denominator in the expression in [34]. As a result, the sign of g_v^* is the same as the sign of the first term in brackets in its numerator, which can be checked to be positive. Note that the term in question indicates the difference between the equilibrium average growth rate, g^*, and the (exogenous) average growth rate which would obtain if average desired accumulation (given by [32]) did not include an accelerator effect (i.e. if $\beta_2 = 0$). And, as [34] and [37] clearly shows, equilibrium average capacity utilization and growth are both higher in the presence of the accelerator effect given by $\beta_2 > 0$ than otherwise.[9]

Other comparative-statics results follow from the demand-led nature of the model. Equilibrium average capacity utilization (and hence equilibrium aggregate output and employment) and growth vary negatively with the average propensity to save, s, and positively with the parameters of the average desired accumulation function (β_0, β_1 and β_2). Equilibrium average capacity utilization and growth also vary negatively with the productivity differential, α. The intuition is clear: a higher α raises the average markup and hence lowers the share of workers' total compensation in income, which then reduces average effective demand. As a

workers' total compensation as a fraction of income, given that the shared-profits component of workers' total compensation falls). Yet other comparative statics explored below will show that profit sharing creates further channels through which the share of workers' total compensation in income (and hence aggregate demand and the level of economic activity) may change.

[9] Although it is also the case that the conditions for positivity and stability of u^* and g^* are more stringent when average capacity utilization is a further separate argument in the average desired accumulation function, as can be easily checked.

result, a higher productivity differential makes for a fall in aggregate employment not only by raising average productivity (see [36]), but also by reducing aggregate output.

The impact of changes in the profit-sharing coefficient, δ, on the equilibrium average capacity utilization and growth is given by:

$$u_{\delta}^{*} = \frac{(s-\beta_1)(1-v\alpha^{-1})\lambda\beta_0}{D^2} \quad [39]$$

and

$$g_{\delta}^{*} = \frac{[g^{*} - s\beta_0 / (s-\beta_1)][\lambda(1-v\alpha^{-1})]}{D^2} \quad [40]$$

where D is as before. As in the expression in [38], the sign of g_{δ}^{*} is the same as the sign of the first term in brackets in its numerator, which is positive. As a result, a rise in the profit-sharing coefficient, which translates into a rise in the share of workers' total compensation in income and consequently raises average effective demand, makes for a rise in average capacity utilization (and hence in aggregate output and employment) and growth.

Finally, it is worth exploring the effect of changes in the frequency of sharing firms, λ, on the equilibrium average capacity utilization and growth, which is given by:

$$u_{\lambda}^{*} = \frac{[(1-v)-(1-\delta)(1-v\alpha^{-1})](s-\beta_1)\beta_0}{D^2} \quad [41]$$

and

$$g_{\lambda}^{*} = \frac{[(1-v)-(1-\delta)(1-v\alpha^{-1})][g^{*} - s\beta_0 / (s-\beta_1)]}{D^2} \quad [42]$$

where D is as before. As it turns out, average capacity utilization and growth vary positively with the frequency of profit-sharing firms if the (common) term in the first set of brackets in the numerator in [41]-[42] is positive. Recall from [12] and [14], respectively, that $(1-\delta)(1-v\alpha^{-1})$ measures sharing capitalists' (net) participation in the income resulting from their own production, while $(1-v)$ measures non-sharing capitalists' participation in the income resulting from their own production. As a result, a rise in the frequency distribution of sharing firms leads to a rise in average capacity utilization and growth if it results in a reduction in the share of capitalists' total compensation in aggregate income. We can solve for the level of the profit-sharing coefficient, say $\bar{\delta}$, at which, given the productivity differential and the real base wage, the fraction of capitalists' total compensation in aggregate income is invariant to changes in the frequency of sharing firms, so that $u_{\lambda}^{*}(\bar{\delta}) = g_{\lambda}^{*}(\bar{\delta}) = 0$:

$$\bar{\delta} = \frac{v(1-\alpha^{-1})}{1-v\alpha^{-1}} \qquad [43]$$

As $\alpha > 1$ and we assumed that $v < 1$ to ensure economically meaningful values of different measures of income distribution, it follows that $0 < \bar{\delta} < 1$. Hence a rise in the frequency of sharing firms leads to a rise (fall) in average capacity utilization and growth if $\delta > \bar{\delta}$ ($\delta < \bar{\delta}$). Intuitively, as the productivity differential is used by sharing firms to raise their markup, for a rise in the frequency of sharing firms to result in higher average capacity utilization and growth it has to lead to a rise in average effective demand and hence in workers' total compensation in aggregate income, which in turn requires that the profit-sharing coefficient is high enough. Note that $\bar{\delta}$ rises with both the real base wage and the productivity differential, as [24'] shows that the magnitude of the effect of a change in the frequency of sharing firms on workers' total compensation as a proportion of aggregate income varies negatively with the real base wage and the productivity differential.

The impact of a change in the frequency distribution of sharing firms on equilibrium aggregate employment is more complex, as average capacity utilization and average productivity vary in response to it. Now, since average productivity varies positively with the frequency of sharing firms, a rise in the latter leading to a fall in average capacity utilization makes for a fall in equilibrium employment. Yet a rise in the frequency of sharing firms leading to an increase in average capacity utilization yields an ambiguous net outcome (recall from the Introduction that the empirical evidence for the employment-enhancing properties of profit sharing is indeed mixed). Using [36], this comparative statics can be formally expressed as:

$$L_{\lambda}^{*} = \frac{(au_{\lambda}^{*} - u^{*}a_{\lambda})K}{a^{2}} \qquad [44]$$

Therefore, $L_{\lambda}^{*} \geq 0$ as $au_{\lambda}^{*} / u^{*}a_{\lambda} \geq 1$. Hence a rise in the frequency of sharing firms will increase, have no effect or decrease equilibrium aggregate employment as the elasticity of average capacity utilization with respect to average productivity is greater than, equal to or less than one.[10]

Consequently, the incorporation of profit sharing creates further channels through which the share of workers' total compensation in income (and hence aggregate effective demand) may change. And, as effective demand depends on distribution both in the interclass (capitalists and workers) dimension and in an intraclass (profit-sharing and non-profit-sharing capitalists) dimension, profit sharing does not necessarily improve macroeconomic performance. Although one should be careful in drawing parallels between Weitzman's (1984, 1985) approach and the one developed here (as they are based on different assumptions), note that Weitzman's proposition that widespread adoption of profit sharing has significant macroeconomic benefits has not been unambiguously confirmed.

Although this paper focuses on the short run, some remarks on dynamics are worth making. Note that the short-run equilibrium solution is characterized by a profitability differential unless the profit-sharing coefficient happens to be exactly equal to $\bar{\delta}$. In fact, $\delta \neq \bar{\delta}$ yields not only a profit share differential, but also (as $u_s^* = u_n^* = u^*$) a profit rate differential, as $r_s^c = \pi_s^c u_s$ differs from $r_n = \pi_n u_n$. As a result, some variable may change over time in response to such a profitability differential. For instance, and abstracting from any structural change to confine attention to components of the profit share differential, the profit-sharing coefficient may be the corresponding adjusting variable. However, while $\pi_s^c < \pi_n$ may conceivably put a downward pressure on δ, this adjustment dynamics would likely be asymmetrical, with $\pi_s^c > \pi_n$ not inducing sharing firms to raise δ. Another alternative would be for the real base wage to be the adjusting variable. Although we have assumed that the nominal base wage is uniform across firms, $\pi_s^c < \pi_n$ may lead sharing firms to revise their nominal base wage downwards. However, this adjustment dynamics

[10] The condition for $L_{\lambda}^{*} \geq 0$ reduces to $(s-\beta_1)(\pi_n - \alpha\pi_s^c) + (\alpha - 1)\beta_2 \geq 0$, which can be satisfied without necessarily violating any of the parametric restrictions assumed earlier.

would likely be asymmetrical as well, as it is not clear why $\pi_s^c > \pi_n$ should induce sharing firms to raise their nominal base wage (though a symmetrically equalizing mechanism may operate in this case if non-sharing firms were led to reduce their nominal base wage).[11] Besides, workers may well succeed in resisting reductions in the nominal base wage (even if only to some extent) and the dynamics of the real base wage would nonetheless also depend on the behavior of the average price level (although profit sharing may conceivably have noninflationary properties if inflation results from conflicting-claims on income). Yet another alternative would be for the frequency of sharing firms to vary with any profitability differential, which would raise the interesting question (among others) of whether heterogeneity as regards workers' compensation mechanism would persist over time. In either of these alternative adjustment dynamics, however, the analysis would be made more complex (even if more interesting) by the fact that, as capital accumulation differs across compensation strategies (see [29]-[30]), the distribution of the capital stock across firms would change over time.

4. Summary

This paper has set forth a simple Neo-Kaleckian short-run model of capacity utilization and growth with distribution featuring profit sharing. As profit sharing has become more common but not universal, firms behave heterogeneously as regards workers' compensation strategy: a given firm compensates workers with either only a base wage or a profit-sharing amount on top of the same base wage. As in the

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[11] Although we assumed that the nominal wage is uniform, all but one of the qualitative results derived in this section would still obtain if the model were re-specified as follows (which indeed would make it closer to Weitzman's). Suppose that firms operate with the highest labor productivity (normalized to one) available by either paying a higher nominal wage or also sharing profits. If $\alpha = w_n / w_s > 1$, sharing firms can set a proportionately higher markup than non-sharing firms but charge the same price (so $\alpha = v_n / v_s$). If we substituted v_n for v, [15]-[25] could still be used as distributive accounting. A rise in α would lower u^*, g^* and L^*, but now, given v_n, by reducing v_s and hence σ (a rise in v_s, given v_n, which implies a fall in α, would then raise u^*, g^* and L^*). Meanwhile, a rise in v_n, given α, would raise u^*, g^* and L^* by raising σ directly and indirectly (as v_s also rises). A rise in δ would raise u^*, g^* and L^*, and a rise in λ would do so if $\pi_n > \pi_s^c$. Hence only the sign of L_λ^* would be affected to become unambiguously positive, given that average labor productivity would be constant at unity.

canonical Neo-Kaleckian model (which does not feature profit sharing), average capacity utilization and growth (and aggregate employment) vary positively with the real base wage. Meanwhile, average capacity utilization and growth (and overall employment) vary negatively with the productivity differential and positively with the profit-sharing coefficient. While a higher profit-sharing coefficient is expansionary irrespective of the distribution of compensation strategies across firms, a higher frequency of profit-sharing firms raises average capacity utilization and growth (and overall employment) only if the profit-sharing coefficient is sufficiently high.

As a comparative static framework was utilized all along, a natural line of extension would be to incorporate dynamic forces, thus addressing relevant issues from which this paper has abstracted. In fact, only by fluke the short-run equilibrium will not be characterized by a profitability differential which would in turn give rise to several possible adjustment dynamics. For instance, the profit-sharing coefficient and/or the frequency of profit-sharing firms (or even the sharing arrangement itself) is liable to change endogenously. Another issue I leave for research in progress (for which the reader is invited to stay tuned) is the effect of profit sharing and other alternative employee compensation mechanisms on conflicting-claims inflation.

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