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Conflict as a closure: A Kaleckian model of growth and distribution under financialization

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Abstract. In this paper, we show how the conflict between the shareholders (owners) and managers of firms in terms of profit rates generates dynamics between growth and distribution that results in a long-run variation in the capacity utilization rate. The model developed here generates oscillations in the rate of capacity utilization in the short run before settling down to its long-run value. Furthermore, the long-run value of the rate of capacity utilization falls within a range of plausible values and this range is determined by the conflict between shareholders and managers. The conflict as a closure, we believe, provides a more realistic microeconomic underpinning to study the impact of distribution on accumulation and long-run utilization. In doing so, we have not taken the approach of the existence of normal utilization rate that is relied upon by the Harrodian authors (Skott 2008, Skott and Ryoo, 2008) and the endogenization of animal spirits in such a way that the actual utilization influences the desired or normal rate of utilization by the Kaleckian authors (Hein 2012, Lavoie, 2003). The model yields hysteresis in that it generates two different disequilibrium growth paths when shareholders and managers struggle to gain control of the firm.

Keywords: Capital accumulation, Rate of capacity utilization, Conflict, Rate of profit, Long run Equilibrium, Hysteresis, Efficient frontier, Finance frontier, Leverage ratio, Shareholders, Managers, Power struggle

JEL codes: E11, E12, D21, E25, E32

1. Introduction

The principle of effective demand underpins the post-Keynesian theories of growth and distribution whereby the rate of profit is determined by growth, particularly those based on Michal Kalecki (1971) and Josef Steindl (1952). In contrast to the Classical models, in these models the independence of capital accumulation of firms from saving at the macroeconomic level is related to the determination of income distribution by the power struggle between capital and labour via the firm level profit mark-up. In this tradition, models by Bhaduri and Marglin (1990), and independently by Kurz (1990), provided a framework to study the impact of distribution on growth in terms of "two ways to expand" depending on the relative response of capital accumulation to profitability and demand/capacity utilization. One of the central results in these models was to show that the redistribution of income towards wages can indeed lead to growth under the condition that capital accumulation responds more strongly to capacity utilization than profitability. In terms of the heterodox growth literature, these two perspectives emerge from the Kaleckian and the Classical traditions.

The class of post-Keynesian models, inspired by the Kaleckian tradition, assume endogenous variation in capacity utilization and essentially show its impact on aggregate demand in the long run. However, the variability of capacity utilization in the long run is severely criticised by authors from the Classical (Marxian) tradition because it is anchored to a fixed "normal" rate of utilization on which firms base their accumulation decisions (for example, Auerbach and Skott, 1988). These authors use the Harrodian instability mechanism to argue that the deviation of actual utilization from the normal rate of utilization will create instability.

In contrast, post-Keynesian authors claim that the *normal* rate of utilization itself is influenced by the actual rate of utilization (Lavoie, 1995, 2010; Dutt, 1997; Commendatore, 2006; Hein, 2012), thus arguing for "hysteresis" in the normal rate of capacity utilization. Furthermore, the Kaleckian response to the Harrodian instability has been in terms of positing shifts in the capital accumulation function (g^i) through changes in the intercept term (assumed to capture Keynes' notion of "animal spirits"), which is assumed to change with respect the deviation between the actual and normal rates of utilization (Hein et al 2012). The Classical (Marxian) authors have rejected the so called "hysteresis" in the normal rate of utilization claim on the basis that it lacks solid behavioural foundations.

The post-Keynesian authors further justified the presence of the hysteresis effect in the normal rate of utilization based on behavioural micro-foundations. Setterfield (2018) proposed a model based on the satisficing behaviour of firm where they showed long-run variation in the capacity utilization even when firms adhere to a fixed *normal* rate of capacity utilization. The reason being that the satisficing firms will tolerate - within limits – deviation of actual values of variables from their target values. The line of reasoning goes back to Dutt (1990, 2010), Lavoie (1992) and using this behavioural micro-foundation Setterfield (2018) showed the variation in the capacity utilization rate within a certain range of the fixed normal rate and thereby providing a model that combines the Harrodian-Kaleckian insights, i.e. variability in the capacity utilization rate in the presence of a fixed normal rate.

In this paper, we attempt a different microeconomic underpinning that is based on conflict, which drives the endogenous adjustment in capacity utilization and offers economic rationale for the range of values that the long-run values of the rate of utilization. We show how the conflict between the shareholders (owners) and managers of firms in terms of profit rates generates dynamics between growth and distribution that results in a long-run variation in the capacity utilization rate.

Interestingly, the dynamics of the model generates oscillations in the rate of capacity utilization in short to medium term before settling down to its long-run value. Furthermore, the long-run value of the rate of capacity utilization falls within a range of plausible values and this range is determined by the conflict between shareholders and managers.

Our contribution to the literature is two-fold:

1. The introduction of conflict provides a more realistic microeconomic underpinning to study the impact of distribution on accumulation and long-run utilization. In doing so, we have not taken the approach of the existence of normal utilization rate that is relied upon by the Harrodian authors (Skott 2008, Skott and Ryoo, 2008) and the endogenization of animal spirits in such a way that the actual utilization influences the desired or normal rate of utilization by the Kaleckian authors (Hein 2012, Lavoie 2003). In contrast, in our model, the actual utilization endogenously adjusts in such a way to find a resolution to the conflict between the shareholders and managers. However, this does not mean that the variables in the system have reached "fully adjusted positions" because conflict is never fully solved. Although we have not endogenized conflict in this model, we show here that for various values of a conflict parameter, we have a different level of equilibrium rate of utilization, i.e. there thus exists a range of long-run equilibrium rates of utilization onto which the utilization settles and the range is defined by the conflict between shareholders and managers.

2. Second, we believe much of the discussion in the literature stem from the fact that these models try to capture the complex dynamics between growth and distribution through linear models, which at best captures very short-term behaviour. In this paper, we aim to take a step forward in terms of proposing a dynamic model that exploits the nonlinearities (through natural feedback mechanisms) of the long-term behaviour, which is lacking in the existing literature. To develop our model, we use the basic Kaleckian growth model developed by Hein et al. (2011, 2012) and the micro theory of firm developed by Lavoie (2002) and further extended to include the conflict claims by Dallery and Van Treeck (2011).

2. Accumulation decision of firms under financialization

We start from the Post-Keynesian theory of the firm, originally presented by Wood (1975), formalised and developed by Lavoie (1992). It was further developed by Dallery (2009) in the context of financialization. One of the essential differences between these articulations is the role of shareholders in the firm. For instance, Lavoie (1992, p. 107) neglects the role of shareholders to influence the strategic orientation of firms and assumes that shareholders play a passive role in the "Galbraithian and Post-Keynesian firm". Whereas Dallery (2009) picks up the argument from the seminal works of Berle and Means (1933) to articulate firms as places of conflict between mangers and shareholders, particularly in the context of financialization. Drawing from the Post-Keynesian literature, Hein (2012) identifies that shareholder power over managers is one of the channels through which financialization impacts on accumulation and growth of firms – "Both the objectives and the constraints of firms as a whole may be affected by increasing financialization. On the one hand, rising shareholder power subordinates management's and workers' preference for (long-run) growth of the firm to shareholders' preference for (short-term) profitability. On the other hand, increasing dividend payments, share buybacks and so forth restrict the availability of finance for firms' real investment projects. Distribution of income is affected by changes in power relations between shareholders, managers, and workers, which then feedback on investment and consumption." (Hein (2012), p.476)

Crotty (1990) has shown that the conflation of ownership and control is one of the shortcomings in the theories of Keynes, Tobin and Minsky. He argues for conceptualizing semi-autonomous agents that he believes create a realistic theoretical vision for the study of real and financial sector interaction and one that is moving through historic time in an everchanging, institutionally contingent relationship, where there is neither one of perfect coordination nor one of complete independence. Crotty (1990) was arguing for conceptualizing varying degrees of semi-autonomy, or varying degrees of conflict between shareholders and managers for the study of real-financial interaction.

The separation between ownership and control has consistently been emphasized not only in the Post-Keynesian literature but also the mainstream Agency-theory literature (Panda et al., 2017). In the latter, studies have identified different types of agency problems depending on whether it is driven by 'manager opportunism' or the 'misalignment effect' (Type I problem) (Jensen and Meckling, 1976; La Porta et. al., 1999; Eklund et al. 2013) and it is dominated by the shareholders and known as 'owner opportunism' or the 'entrenchment effect' (Type II problem) (Abdullah et al., 2015).

2.1 Finance frontier and Expansion frontier

To see this more formally, we rely on the Post-Keynesian theory of firm well developed in the literature. The analytical apparatus has two frontiers - the finance frontier and the expansion frontier in the profit rate (r) and accumulation rate (g) space (Lavoie, 1992). Whereas the finance frontier indicates the profit rates required to sustain different growth strategies, the expansion frontier associates each growth strategy the profit rate that can be optimally be realized.

The finance frontier can be derived from the equality of sources and uses of funds, where we assume that the firm has decided its productive investment based on its retained earnings and external funds. In terms of the derivation of the finance frontier, we use Dallery (2009), with some minor modifications. Starting from the equality of use and source of funds, i.e.

$$I = IF + OF \qquad (1)$$

$$I = (\Pi - i_s K_s - i_l K_l) + a(\Pi - i_s K_s - i_l K_l)$$

where $IF(= \Pi - i_s K_s - i_l K_l)$ is the internal funds (or retained earnings), which in turn is profits Π minus dividend payments $i_s K_s$ and interest payments $i_l K_l$ to loans, and OF is the outside or external finance which is a multiple (a) of retained earnings, signifying Kalecki's Principle of Increasing Risk.

Further, assuming that firms also finance a percentage x of their investment from external sources, say new net share issues (x_s) and new net debt (x_d) each as a ratio of physical investment. Letting i be the interest rate as before, D the existing stock of debt and e_r the retained earnings, we can rewrite the above equality as

$$I = e_r(\Pi - iD) + x_s I + x_d I,$$

$$\Pi = I\left[\frac{1 - x_s - x_d}{e_r}\right] + iD.$$

Dividing by K and letting $r = \frac{\Pi}{K}$, $g = \frac{I}{K}$, and $d = \frac{D}{K}$ yield a simple linear formulation of the finance frontier given by

$$r = g\left[\frac{1 - x_s - x_d}{e_r}\right] + id$$

or simply

$$r = l_1 g + l_0, \qquad (2)$$

where $l_1 = \left[\frac{1-x_s-x_d}{e_r}\right]$ and $l_0 = id$.

The expression for the finance frontier (2) can also be expressed terms of profit share (h), since $r = \frac{hu}{v}$, where u is the rate of capacity utilization and v is capital to potential output ratio. Assuming mark-up pricing, it follows that the finance frontier can be associated with the pricing behaviour of the firm. In that case, the finance frontier yields the minimum *profit margin* necessary to secure investment, which is incorporated into pricing decisions.

The finance frontier (2) is a linear function that relates the minimum rate of profit, r, that is necessary to implement any rate of accumulation, g. The more the firm desires to invest the higher the profit rate (or profit margin) is necessary to finance its accumulation goal, given the average rate of interest payable on its capital. Similarly, the higher the rate of interest is the higher rate of profit is required to implement a given rate of accumulation, and the higher the leverage ratio (the ratio of borrowed funds to the retained earnings l_1) is the higher rate of profit to implement a given rate of accumulation, g, is required. As we will see later in this Section, the finance frontier (2), even in this simple characterization, provides a way to capture the power struggle between shareholders and managers through endogenizing the leverage ratio. The area under the finance frontier is not accessible in the long run for firms since companies in this zone could not sustain their rate of growth since external finance would no longer be forthcoming.

The second curve of the theory of the firm is called by the expansion frontier, Lavoie (1992), which provides a schedule of the maximum level of profitability that can be reached for each rate of investment. The expansion frontier is argued to have a concave relation between accumulation and the rate of profit. This is because of the *Penrosian effect*, which argues that when firm grows there are positive effects on profitability up to a certain rate of growth and thereafter negative effects sets in due to managerial limitations in handling the speed of expansion, in contrast to the absolute size of the organization.

Putting these together in the (g, r) space, Figure 1(a) shows both the finance frontier (FF) and the expansion frontier (EF). The rate of profit r_{sh}, refers to the shareholders maximize their preference and the corresponding accumulation level is given by g_{sh}. Similarly, r_{sm} is the rate of profit corresponding the accumulation level g_{sm},which is where managers' preferred position as it both satisfies the finance constraint as well as delivers higher level of accumulation.

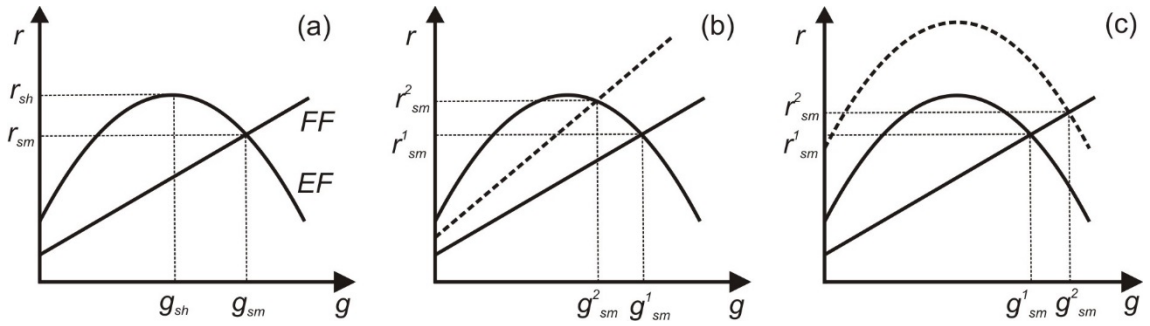

Figure 1: (a) The Finance and Expansion and frontiers FF and EF, respectively, of the Post-Keynesian firm. (b) A positive rotation of the Finance frontier. (c) An upward shift in the Expansion frontier.

The effect of financialization on these frontiers is well theorised in the literature (Lavoie, 1992; Dallery, 2008; Dallery and Van Treeck, 2009; Stockhammer, 2004). In terms of the finance frontier, from our point of view, as shareholders put pressure on managers for higher rate of profit, managers distribute more dividends, in which case the retained earnings e_r goes down, or they try preserve the share value in the market by not issuing new net shares (*xs* falls), or increase the share value by share buy-backs (*xs* becomes negative), or increase in indebtedness (*d*) consecutive to debt-financed spending (increase in *xd*). In the case where the firm increases its dividend payments (or reduces its retained earnings), the finance frontier would rotate counter-clockwise (a positive rotation) via the l_1 term. The shift in the finance frontier is caused by new net borrowing, i.e. via changes in l_0 term.

In terms of the expansion frontier, facing increasing pressure from shareholders for higher profit rate, managers can react in three possible ways. This can be seen from the profit-rate decomposition – either by increasing the profit margin, or by increasing the utilization rate, or through a higher capital coefficient, or a combination of the three. However, here we assume the competitive nature of the product market does not allow the managers to change their mark-up or profit margin. Therefore, in the short run, yielding to shareholders' pressure to increase profit rate is possible either through higher productivity or wage reductions. In this model, we assume that managers instead of taking the route of nominal wage reduction, which usually evokes sharper negative response from workers, would heed to shareholders pressure through a more intense use of productive capacity. This would imply that managers accept to operate above the rate of capacity utilization that corresponds to their accumulation target, if it allows them to reach a better profit rate. Thus, in the context of conflict, managers face a trade-off between shareholders' profit-rate target and their own utilization target and in terms of the expansion frontier, the increase in the rate of utilization shifts the frontier upwards. Consequently, the firm will be exposed to an increased risk of default in case of an unexpected rise in demand.[1] The effect on financialization on these two frontiers by way of shifts in these curves are shown in Figures 1(b) and (c).

3. The Model

The aim here is to show how conflict between shareholders and managers results in the endogenous emergence of a long-run equilibrium rate of utilization for the firm. Our approach does not invoke any "normal" rate of utilization, neither that the actual utilization rate changes the normal rate of

[1] This is referred to as "risk transfer" in the literature (Dallery, 2008) as managers try to balance the *real* security based on their growth objective and the profitability demands stemming from shareholders, the risk of accommodating latter groups' demand leads to an increase in the risk of satisfying market demand at a higher level of utilization - transfer of financial risk into a real risk.

utilization. We show that the conflict between the owners and the managers results in a range of values for the long-run equilibrium rate of utilization and that range is defined by the conflict.[2] We show that using conflict as a behavioural closure provides a more realistic way to understand the long-run equilibrium value, which is usually assumed to be "fully adjusted position". In such a case the long-run equilibrium values must correspond to situations where all conflicts are resolved and that the economy is in a state of "perfect harmony". However, conflict is a continuing undercurrent in the evolution of capitalism and its persistence is what makes the system more unequal. Our analytical approach aims to bring out this essential characteristic in the context of long-run growth dynamics. In what follows, we discuss the assumptions and set up the model.

3.1 Expansion frontier

Following the discussion in the previous section, we introduce the expansion frontier to represent the expected profitability of a firm's investment possibilities. The expansion frontier gives us the accumulation rate for any given profit rate, and taking the Penrosian effect into account we can define it as a concave function in the (g, r) space as shown in Figure 1. In the context of conflict, as shareholders demand higher proportion of profits, managers negotiate and accommodate their demands by adjusting the rate of utilization and to reflect this aspect we propose the following simple expansion frontier that has the required properties,

$$EF(g,u) = ug(a - bg) \qquad (3)$$

for some positive parameters *a* and *b*.

In our characterization, the profit rate is proportional to the rate of utilization as in the Kaleckian growth models, which implies that the expansion frontier will shift for any change in u, i.e. the expansion frontier is defined for a particular utilization rate and any change in the actual utilization, both strategic or forced, will lead to a shift in the expansion frontier. Note that the expansion frontier is updated according to the current utilization rate. The formulation (3) provides a simple way to capture the impact of conflict on the expansion frontier through actual utilization rate and also allows us to see the emergent behaviour of rate of profit, accumulation rate and long-run equilibrium rate of utilization.

3.2. Finance frontier

The finance frontier given in (2) is a linear function that relates the minimum rate of profit, r, that is necessary to implement any rate of accumulation, g. The more the firm desires to invest, the higher the profit rate (or profit margin) necessary to finance its accumulation goal. In the context of shareholders' dominance, who demand higher proportion of profits, thus has a bearing on the accumulation and utilization goals of managers. We posit a simple linear finance frontier as in (2), but in our formulation the leverage ratio is endogenized, to capture the conflict, and is given by

$$FF(g,u) = l_1(u)g + l_0 \qquad (4)$$

for the adaptive parameter $l_1(u)$ and constant l_0.

[2] One could also argue that the long-run equilibrium value of utilization is the "normal" rate of utilization. However, we show that this need not unique and that there exists a range of value defined by the conflict.

3.3 Conflict dynamics

We model the conflict between the shareholders and managers of a firm in the following way.[3] For ease of exposition, we first describe the conflict using Figure 2 before formalizing the argument. In Figure 2, point A, the shareholders maximize their profit claim at r_{sh}, which is given at the accumulation rate g_{sh}. The rate of accumulation that satisfies the finance constraint, g_{sm}, and the corresponding rate of profit r_{sm} is where managers achieve maximum growth (point B) given the expansion and finance frontiers.

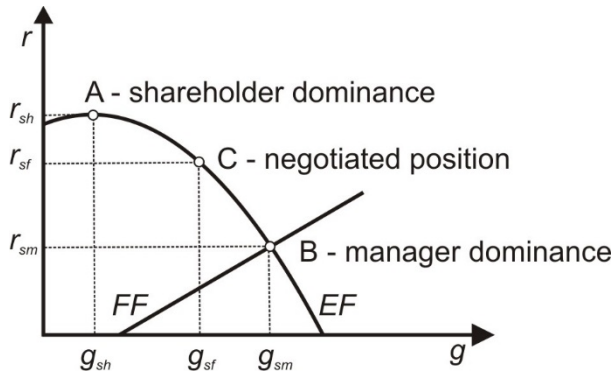

Figure 2: The points A (g_{sh},r_{sh}), B (g_{sm},r_{sm}), and C (g_{sf},r_{sf}) of the post-Keynesian firm.

We introduce conflict using an exogenously given parameter δ, which lies between 0 and 1, and define

$$r_{sf} = \delta r_{sh} + (1-\delta) r_{sm}, \qquad (5)$$

where r_{sf} is the negotiated rate of profit between the shareholders and managers. From an economic point of view, the δ parameter decides what proportion of profit rate is divided between shareholders and managers. When $\delta = 1$, shareholders dominate and demand the target rate of profit to be at the maximum permissible rate (r_{sh}). Or in other words, where $\delta = 1$, the profit rate is at is maximum and the shareholders get max(EF)-FF. When $\delta = 0$, managers prevail, and the negotiated rate of profit coincides with the economically viable rate of accumulation rate given by g_{sm} and the corresponding rate of profit of r_{sm}, or in other words, the shareholders get nothing, where EF=FF.

Given the respective power of shareholders and managers, i.e. for a given value of δ the corresponding negotiated rate of profit (r_{sf}) may lie between the two extremes and we define the evolution of actual rate of profit towards r_{sf} as

$$\frac{dr}{dt} = -\rho\big(r - r_{sf}\big), \qquad \rho > 0. \qquad (6)$$

For a given δ, if the current rate of profit r is less (greater) than the negotiated target rate of profit r_{sf}, then the firm will aim increasing (decreasing) the actual or current rate of profit. Simply put, the

[3] This formulation is similar to that of Dallery and Van Treeck (2011) except that ours is in dynamic form.

differential equation (6) drives the profit rate to the target rate, which is not a given number but a relation between the highest (shareholders) and the lowest (managers) profit rate, which in turn are determined by the expansion and finance frontiers.

Once the negotiated rate of profit for a given δ is set the managers want to maximize the growth or rate of accumulation rate to the largest possible value (g_{sf}), which lie on the expansion frontier (see point C in Figure 2). In the (g, r) space, a simple evolution of the rate of accumulation (g) corresponding to (6) can thus be given by

$$\frac{dg}{dt} = -\gamma(g - g_{sf}), \qquad \gamma > 0. \tag{7}$$

The realization of firm-level conflicting claims on profit rate is subject to the effective demand constraint at the macroeconomic level. We incorporate the demand side, where the actual utilization (u) is driven in a simple way by aggregate demand, so that the dynamics of utilization is given by

$$\frac{du}{dt} = \mu(g - g^s), \quad \mu > 0, \tag{8}$$

where g is rate of capital accumulation. The function g^s the saving rate, which is determined by the rate of profit (Hein et al. 2012) and is given by

$$g^s = s_f r + s_z(1 - s_f)r, \tag{9}$$

where $s_f, s_z \in (0,1)$ are the saving propensities of managers and shareholders, respectively.

Summarizing the above discussion, our model is given by the system of three differential equations

$$\begin{aligned} \frac{dr}{dt} &= -\rho(r - r_{sf}), \ \ \rho > 0, \\ \frac{dg}{dt} &= -\gamma(g - g_{sf}), \ \ \gamma > \ 0, \\ \frac{du}{dt} &= \mu(g - g^s), \quad \mu > 0, \end{aligned} \tag{10}$$

and the four functions for the expansion frontier, the finance frontier, the negotiated profit rate given by the parameter δ and the savings rate, which are given by

$$\begin{aligned} EF(g,u) &= ug(a - bg), \\ FF(g,u) &= l_1(u)g + \ l_0, \\ r_{sf} &= \delta r_{sh} + (1 - \delta)r_{sm}, \end{aligned}$$

and

$$g^s = s_f r + s_z(1 - s_f)r,$$

respectively. The conflict between shareholders and managers, given by the parameter δ, drives the system by triggering a change in the r and g dynamics in (10). Given the target profit (r_{sf}), corresponding to the value of δ, both the rates of profit and capital accumulation gets adjusted by

shareholders and managers respectively, which is captured by the $\frac{dr}{dt}$ and $\frac{dg}{dt}$ equations in (10). As managers try and adjust the rate of accumulation corresponding to the target profit rate by changing the actual utilization rate, it triggers a shift in the expansion frontier and consequently changes the slope of the finance frontier. The disequilibrium dynamics play out in the short run and the system settles to a long-run equilibrium rate of utilization when the rate of capital accumulation equals the saving rate. Thus, the long-run equilibrium rate of utilization is a "solution" for a value of δ, after exhibiting short-run fluctuations in the variables g, r and u.

4. Results and discussion

4.1 The long run equilibrium

Both analytical and numerical analysis of the model (10) was conducted and we report the latter results for ease of exposition. First, the time histories or the evolution of the variables g (capital accumulation), r (rate of profit) and u (rate of capacity utilization) for two different values of the conflict parameter (δ), with the same initial conditions, are shown in Figure 3. As can be seen in the figure, there are short run fluctuations in the rate of profit (r) and in the rate of utilization (u) before settling down to their respective long-run equilibrium values. In this specific case, the rate of capital accumulation monotonically converges to its long-run value. It can also be noted from Figure 3 that in this specific case the higher the value of the conflict parameter,($(\delta = 0.9)$, see Figures 3(b) and 3(d)), which signifies the dominance of shareholders vis-à-vis managers, the larger the short-run fluctuations in the rate of profit (r). Also, the rate of utilization (*u*) and the capital accumulation (*g*) settles down to lower long-run equilibrium values. Thus, when shareholders' power is dominant over managers, the model results in larger disequilibrium fluctuations with the capital accumulation settling to a lower long run equilibrium value.

4.2 Conflict and the long run equilibrium

From Figure 3, it is clear that the long-run dynamics (equilibrium values) are different as δ varies. To highlight this, in Figure 4 we show how the equilibrium values vary as the parameter δ is varied. We see that when δ is small (manager dominated) the equilibrium growth and profit rates are higher than for large δ (shareholder dominated). As the value of the conflict parameter increases, i.e. as shareholders begin to dominate managers, the long-run equilibrium values of the rate of profit (r), capital accumulation (g) and the rate of utilization (u) decline. This is particularly interesting in the case of rate of utilization where the model yields distinct long-run equilibrium values for each value of the conflict parameter. Thus, the dynamics of the conflict results in a range of values for the long-run equilibrium rate of utilization and the range is given by the conflict. Even if one argues that the long-run equilibrium rate of utilization is the "normal" rate of utilization, we show, particularly in the context of conflict between shareholders and managers, that the normal rate of utilization is not unique and it lies within a range defined by conflict.

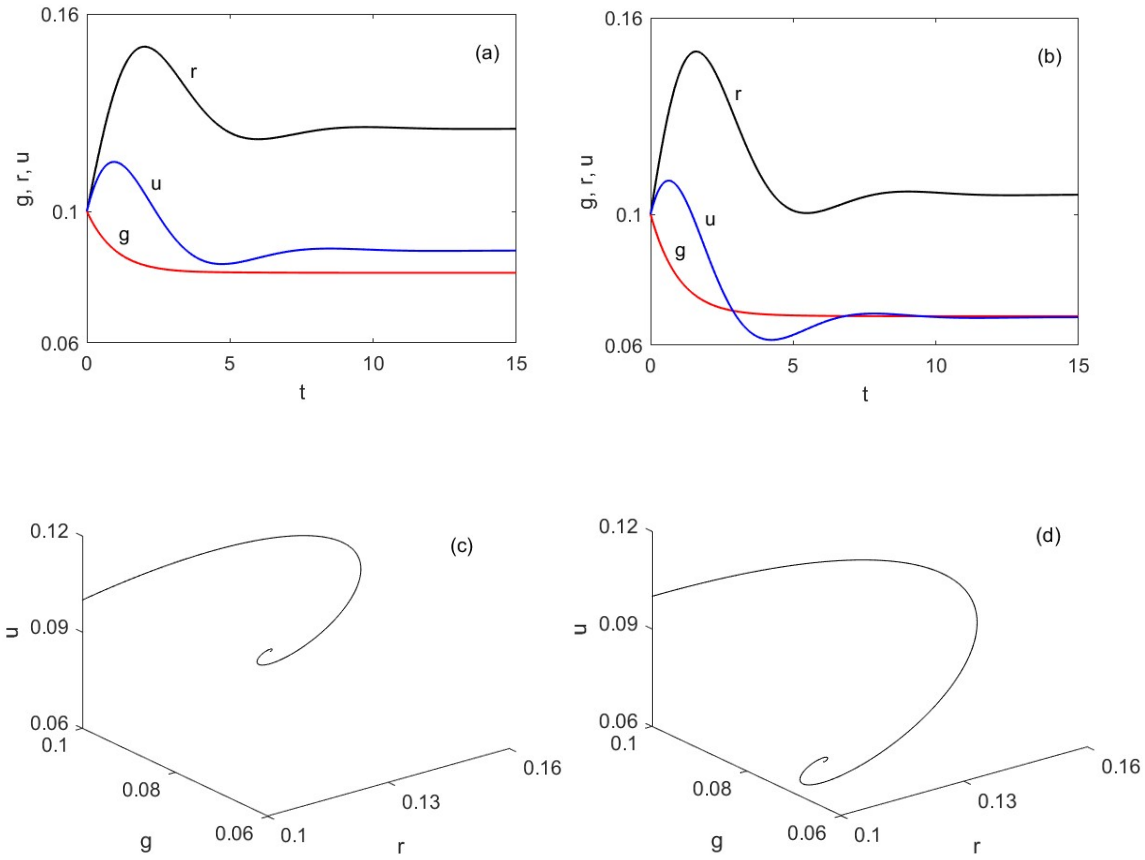

Figure 3: Time histories for g(t), r(t) and u(t). In (a) and (c) δ = 0.1 and in (b) and (d) δ = 0.9.

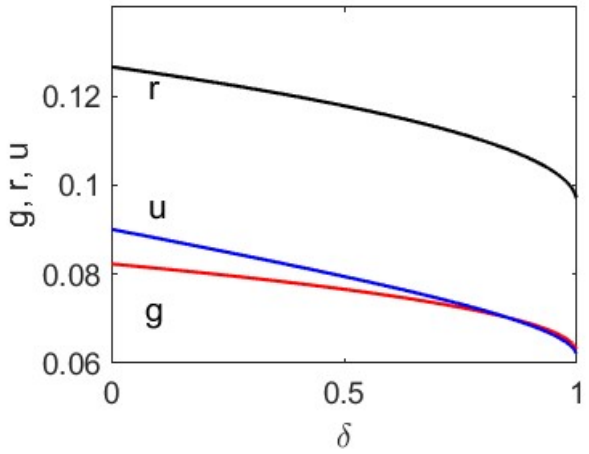

Figure 4: Equilibrium values of *g*, *r* and *u* points when varying δ.

4.3 Paradox of thrift in the long run

The paradox of thrift result holds in the long run. We show this result in Figure 5, where the long-run equilibrium values of the rate of profit (r) and rate of utilization (u) decline as the saving propensities

of both the managers (firm) and the shareholders, i.e. s_f and s_z respectively, are increased. Thus, our model shows the long-run relevance of effective demand in the case where there is conflict between the shareholders and managers. However, it would be interesting to see if the results hold when we extend our model to include workers and their conflict with the mangers.

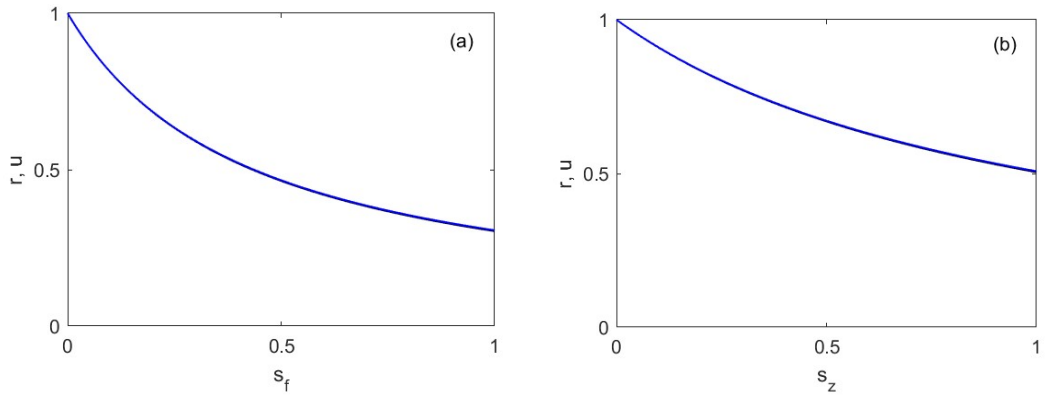

Figure 5: Normalised equilibrium values for *r* and *u* when varying the savings parameters (a) s_f and (b) s_z. Note that the normalized *r* and *u* evolve very similarly with the savings parameters. Both figures highlight the paradox of thrift.

4.4. Dynamics of power struggle

Finally, our model yields an interesting insight in to the dynamics of power struggle between shareholders and managers. We analysed the behaviour of our proposed model in two scenarios. In the first scenario, shareholders are powerful and managers struggle to regain some autonomy, which is the case where the conflict parameter δ is varied from a higher value to a lower value. In the second scenario, we analysed the opposite case where managers are powerful to start with and shareholder try and regain control of the firm, and this case is represented by varying the conflict parameter δ from a lower value to a higher value. Figure 6 shows the results of our analysis in the (g, r) space.

Figure 6(a) shows the case when shareholders are dominant and managers try to regain control of the firm. The value of the conflict parameter is varied from $\delta = 0.9$ to $\delta = 0.1$. Since managers are dominant to begin with and shareholders try and regain control, as δ is gradually decreased, the long run equilibrium values of the rate of profit (r) and capital accumulation (g) increases. This because managers' aim is to grow the firm, the expansion frontier shifts upwards and together the finance frontier rotates counter clockwise to make system move from long run equilibrium I to the higher long run equilibrium value of II. In this case, managers' struggle to wrest power from the shareholders expands the firm.

On the other hand, when mangers are dominant and shareholders try to regain control of the firm, shown in Figure 6(b) where the conflict parameter is varied from $\delta = 0.1$ to $\delta = 0.9$. In this case, as shareholders try and regain control from managers, i.e. as δ is gradually increased, the long run equilibrium values of the rate of profit (r) and capital accumulation (g) falls. This is because as shareholders' pressure for higher profits keeps increasing, managers have no other option but to reduce the rate of utilization, which in turn shifts the expansion frontier downwards. Starting from the long-run equilibrium II the system shrinks to the lower long run equilibrium value I.

Interestingly, the disequilibrium trajectories when switching the control parameter δ back and forth between 0.1 and 0.9 do not follow the same path, as shown in Figure 6(c). The system shows hysteresis as the trajectories take different paths for moving back and forth between the same values of the control parameter. This is interesting from an economic point of view as our model shows the distinct disequilibrium dynamics in terms of the growth paths arising from the conflict between managers and shareholders. In other words, our results show the implications of the struggle between short-term profitability objectives pursued by shareholders versus the long-term growth objectives pursued by the managers on the growth path of the firm.

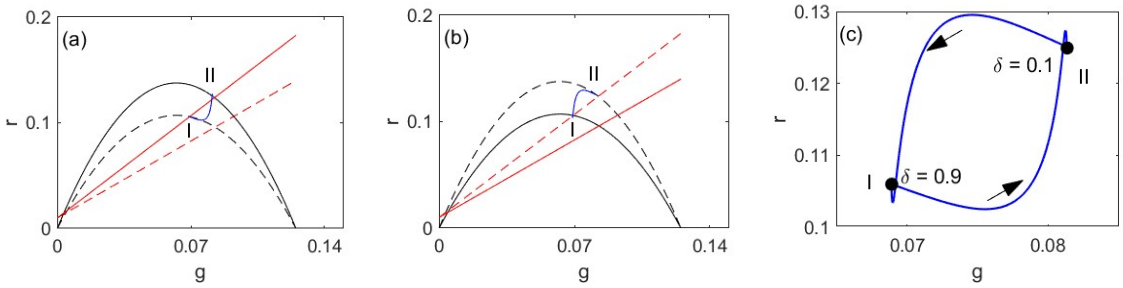

Figure 6: Trajectories showing hysteresis when switching δ back and forth between 0.1 and 0.9.

5. Conclusions

Post-Keynesian models of growth and distribution inspired by the Kaleckian tradition assume the endogenous variation in capacity utilization to essentially show the impact on aggregate demand in the long run. However, the variability of capacity utilization in the long run is severely criticised by authors from the Classical (Marxian) tradition based on Harrodian instability principle because of the existence of the so called fixed "normal" rate of utilization and argue that any deviation of actual utilization from the normal rate will create instability. But Post-Keynesian authors argue that the normal rate of capacity utilization itself is influenced by the actual rate of utilization and use Keynes' notion of "animal spirits" to capture the deviation between the actual and normal rates of utilization. The Classical (Marxian) authors have rejected the so called "hysteresis" argument on the basis that it lacks behavioural foundations. Recently, Post Keynesians attempted address the micro foundations shortcoming by proposing "satisficing" principle for the firm where firms will tolerate, within limits, any deviation of actual values of variables from their "normal", or "target" values, which in turn allowed long-run variation in the capacity utilization even when firms adhere to a fixed normal rate of capacity utilization. However, there is no general principle by which one can discern what would the tolerance range in terms of the deviation of the actual rate of utilization from the normal rate utilization.

In this paper, we propose a different microeconomic underpinning that is based on conflict, which drives the endogenous adjustment in capacity utilization and offers economic rationale for the range of values that the long run values of the rate of utilization. We show how the conflict between the shareholders (owners) and managers of firms in terms of profit rates generates oscillations in the rate of capacity utilization in short term before settling down to its long run equilibrium value. Furthermore, the long-run equilibrium value of the rate of capacity utilization falls within a range of plausible values and this range is determined by the conflict between shareholders and managers.

We also use a different approach in that we neither invoke the notion of 'normal' rate of utilization used by the Classical (Marxian) authors nor endogenize 'animal spirits' in such a way that the actual

utilization influences the desired or normal rate of utilization by the Post Keynesian authors. In our model, the actual rate of utilization endogenously adjusts and settle down to its long run equilibrium value before exhibiting short run oscillations. Although we have not endogenized conflict, we show that for various values of the conflict parameter our model yields different level of equilibrium rate of utilization, i.e. there thus exists a range of long-run equilibrium rates of utilization. We also believe that our approach takes a step forward in terms of proposing a dynamic model with nonlinear feedback to generate long-term behaviour of the variables in question. We believe much of the discussion in this literature use linear models, which at best captures short-term behaviour and does not allow to exploit the nonlinearities and nonlinear feedback between various variables. We believe our model provides a step in this direction.

The model developed here yields some interesting insights for the study of long run growth and distribution. First, the disequilibrium dynamics of model generates short run fluctuations, in terms of oscillations, before settling to a long run equilibrium values for rate of profit, and the rate of capacity utilization. Second, the long-run equilibrium values are not unique and there exists a range defined by the conflict parameter. Given a particular value of the conflict parameter, where higher value of δ signifies shareholders dominance and a lower value signifies managers dominance, the dynamics of our model shows how the long-run equilibrium is reached. In a sense, there exists a long-run equilibrium rate of utilization which can be seen as a "solution" for each value of δ. Therefore, there exists a range of "solutions" and the range is defined by the range of the conflict parameter, and for each value of the conflict parameter, the system finds a temporary resolution by settling to a particular long-run equilibrium value of utilization. From the perspective of our model, the notion that the long run equilibrium value is an unique 'normal' rate of utilization does not hold, since even if one thinks that is the case, our results show that conflict generates a range of values for the 'normal' rate of utilization.

Furthermore, we see that when δ is small (manager dominated) the long run equilibrium growth and profit rates are higher than for large δ (shareholder dominated). This is an interesting result particularly in the context of the dynamics of power struggle between managers and shareholders. In the case where shareholders are dominant and managers try and regain some autonomy, the case where the conflict parameter δ is varied from a higher value ($\delta = 0.9$) to a lower value ($\delta = 0.1$), the dynamics of this power struggle results in the higher level of equilibrium rate of profit and capital accumulation (Figure 6(a)). On the other hand, when managers are dominant and shareholders try and regain control, the case where the conflict parameter δ is varied from a lower value ($\delta = 0.1$) to a higher value ($\delta = 0.9$), the dynamics of power struggle results in a lower level of equilibrium rate of profit and capital accumulation (Figure 6(b)). The disequilibrium trajectories when switching the control parameter δ back and forth between 0.1 and 0.9 do not follow the same path, as shown in Figure 6(c) and the system exhibits hysteresis as the trajectories take different paths for moving back and forth between the same values of the control parameter. The distinct disequilibrium dynamics in terms of the growth paths arising from the conflict between managers and shareholders is interesting from an economic point of view as it points to the relative fragility of the short term profitability motives pursed by firms under pressure from the shareholders.

Our results also reveals the existence of paradox of thrift in the long run (Figures 5(a) and 5(b)), which signifies the relevance of effective demand in the long run. This result must be taken with a caveat that it is sensitive to the functional form of the Expansion frontier. Unlike in the Post Keynesian models with linear Investment function, we do not assume any explicit functional form for capital accumulation (g) and hence this result is sensitive to the form, and shifts of the expansion frontier and the finance frontier. The other result of paradox of costs seem to hold, which can be

intuitively seen from the lower long run equilibrium values of rate of profit, rate of utilization and capital accumulation for a high conflict parameter value (Figure 4). This result needs further verification in a full model where pricing policy of firm is included in the analysis.

Nonetheless, even within the limited scope of investigation, our results highlight that emergent properties due to the feedback mechanisms within the system and without resorting any stochastic shocks and other artefacts. We believe that our model provides a more realistic behavioural micro foundations in terms of conflict and implications to the long run equilibrium growth. On the methodological front, the dynamical systems approach provides us a way to understand complex dynamics using simple feedbacks as well as characterize the emergent long-term dynamics without the need for assumptions such as 'normal' rate of utilization. While our model needs further extension, we believe it offers a starting point to build simple feedback models and study the long run dynamics of capital accumulation and distribution.

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