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# A(nother) Note on the Inconsistency of Neo-Kaleckian Growth Models

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**Abstract**

As a matter of common knowledge, the canonical Neo-Kaleckian growth model is not able to reconcile the actual and normal rates of utilization in equilibrium. Dávila-Fernández et al. (2017) revive an old proposal for solving this problem – making the rate of normal utilization an endogenous variable that converges to the actual utilization rate – justifying it with new premises, based on a recent contribution to production theory (Nikiforos 2013). In this note, we argue that their proposed adjustment mechanism is based on restrictive assumptions, some of which have little economic justification. Moreover, we show that also if one puts aside for the sake of argument the perplexities regarding the 'endogenization' of the normal rate of utilization, the existence of autonomous components of demand is sufficient to invalidate their results.

**Keywords**: Neo-Kaleckian model; Autonomous Demand; Sraffian Supermultiplier; normal utilization

**JEL codes**: E11; E12; E22

## 1. Recent debates in post-Keynesian growth theory[*]

The Neo-Kaleckian model of growth and distribution (Rowthorn, 1981; Dutt, 1984; Amadeo, 1986) has been the subject of vibrant theoretical debate in the last three decades. If, on the one hand, it has progressively imposed itself as an influential contribution to macroeconomic modelling, it also raised serious concerns. Running the risk of over-simplification, the main argument of contention and the principal critique raised against the Neo-Kaleckian model is its incapacity to reconcile the actual and normal rate of capacity utilisation in equilibrium (Skott, 2012; Cesaratto, 2015). As recognized also

[*] The authors are grateful to Peter Skott and an anonymous referee for helpful comments on earlier drafts of this paper.

by its proponents (see Hein et al., 2012), any attempt to restore, within the Neo-Kaleckian model, a normal degree of capacity utilisation by means of a standard Harrodian mechanism is bound to generate Harrodian instability. In order to avoid this outcome but maintain the other features of the model, some authors have proposed making the normal degree of capacity utilisation itself an endogenous variable, which would simply adapt to the realized degree of utilisation (Hein at al., 2012).

Another important line of critique targets the Neo-Kaleckian treatment of income distribution, and in particular, the confusion between normal profits rates – those that comprise "distribution in the relevant sense" (Garegnani, 1992, p. 60) – and the actual ones.[1] However, in this short note we will focus our attention on problems related with the first issue.

During broadly the same time span, other scholars[2] advanced an alternative proposal – labelled as the 'Sraffian Supermultiplier' model – according to which an adequate consideration of the role of non-capacity generating autonomous demand allows to reconcile the extension to the long-run of the principle of effective demand; an investment function based on the accelerator mechanism; an equilibrium level for the degree of capacity utilisation equal to the normal, desired one; and the stability of the equilibrium for plausible ranges of the parameters. As shown by some recent contributions (Allain, 2015; Lavoie, 2016), the basic insights of the Sraffian Supermultiplier model can be produced by modifying some key assumptions of the Neo-Kaleckian model.[3]

In a recent article on Metroeconomica, Dávila-Fernández, Oreiro, and Punzo (hereafter DOP) propose a critique of this research agenda (Dávila-Fernández et al., 2017). Their formulation follows the model in Lavoie (2016), which we briefly summarize here:

$$g^K = I/K = \gamma + \gamma_u(u-u_n) \quad (1)$$

$$g^S = S/K = s_p \Pi u/v - z \quad (2)$$

Equation (1) is a standard Neo-Kaleckian accumulation function, where accumulation depends on the entrepreneurs' expectations of the growth rate of demand ($\gamma$), $\gamma_u$ is a positive reaction coefficient, u and $u_n$ are, respectively, the actual and the normal degree of capacity utilisation. Equation (2) is the saving function, normalized by the capital stock: $s_p$ is capitalists' propensity to save (workers are assumed not to save), $\Pi$ is the profit share, v is the normal capital-output technical coefficient, z is autonomous demand (Z) normalized by the capital stock; Z grows at the given rate $g^Z$.[4] The short-run equilibrium, obtainable by imposing $g^K = g^S$, is characterized by

[1] See also Cavalieri et al. (2004) and Cesaratto (2015).

[2] See for example Serrano (1995); Bortis (1997); Cesaratto et al. (2003); Freitas and Serrano (2015).

[3] See also Nah and Lavoie (2017). Other recent contributions that stress the importance of autonomous demand as a driver of economic growth include Fiebiger (2017) and Fiebiger and Lavoie (2017).

[4] By defining Z as autonomous, we are simply implying that it is not determined by domestic macroeconomic conditions. It is, on the other hand, obviously historically and socially determined (see Girardi and Pariboni, 2015 and 2016).

$$u^* = \frac{(\gamma - \gamma_u u_n + z)v}{s_p \Pi - v\gamma_u}. \quad (3)$$

However, the economy does not remain in the short-run position where $u = u^*$. The z ratio evolves according to the following law of motion:

$$\dot{z} = z(g^Z - g^{K*}) = z[g^Z - \gamma - \gamma_u(u^* - u_n)]. \quad (4)$$

The model is closed by the assumption of adaptive expectations: firms gradually revise their expectation on the growth rate of the economy based on the actual observed accumulation rate, with $\mu$ being a positive coefficient.

$$\dot{\gamma} = \gamma\mu(g^{K*} - \gamma) = \gamma\mu\gamma_u(u^* - u_n) \quad (5)$$

Given the specification of the accumulation function, it is possible to rearrange the same equation in terms of reactions to divergences between the actual, short-run degree of capacity utilisation and the normal rate. Imposing $\dot{z} = \dot{\gamma} = 0$ in the system of differential equations given by (4) and (5), it is possible to obtain the fully adjusted equilibrium position of the model, with $g^Y = g^K = g^Z = \gamma$ and $u = u_n$.[5]

## 2. DOP's critique of supermultiplier models

DOP correctly point out that the simple introduction into the picture of autonomous demand does not guarantee the convergence of the degree of capacity utilisation to its normal level (although, to our knowledge, no proponent of the model has ever argued otherwise). Indeed, the introduction of an equation like (5) is necessary to allow for a full adjustment of productive capacity to demand.[6] DOP go on to criticize the mechanism implied by this equation. Their argument is that this adjustment process would produce an outcome in which "*Keynesian uncertainty and entrepreneurs' animal spirits have no role in long-run growth*" (Dávila-Fernández et al., 2017, p. 4), while these elements should in their view be an integral and explicit part of any growth model. Based on this motivation, they argue that the Harrodian mechanism of equation (5) should be substituted with the endogenization of the normal degree of capacity utilisation ($\alpha > 0$ is a positive parameter):

$$\dot{u}_n = \alpha(u^* - u_n) \quad (6)$$

However, *this time is different*: the rationale behind the convergence of $u_n$ towards the realized degree of capacity utilisation does not have much to do with standard Neo-Kaleckian stories (see Hein et al., 2012). It is based instead on recent contributions by

[5] The stability of Supermultiplier-type models is subject of ongoing debate. See Freitas and Serrano (2015); Allain (2015) and Lavoie (2016) for proposed proofs of the dynamic stability of the equilibrium of the model. Skott (2017a and 2017b) provides a more pessimistic view regarding the stability of the model.

[6] See Cesaratto et al. (2003) and Freitas and Serrano (2015) for the provision of slightly different mechanisms, that in any case preserve the logic of equation (5).

Nikiforos (2013, 2016), who argues that it is possible to prove the endogeneity of $u_n$ by means of an analysis at the firm level, which relies exclusively on cost minimization.

## 3. The assumptions behind the DOP approach

It is not the purpose of this article to discuss the plausibility of the model proposed by Nikiforos (2013). We believe, nonetheless, that it is useful to compare the number and the restrictiveness of the assumptions behind the adjustment mechanism in Lavoie (2016) (equation 5) and that proposed by DOP (equation 6).

In order to justify equation (5), it has to be assumed that entrepreneurs revise their assessment of the trend growth rate of the economy according to the following logic: if the actual accumulation rate is higher (lower) than the expected growth rate, expectations are revised upwards (downwards).

In the background of equation (6), on the other hand, there is an analysis which rests on the following assumptions: firms have (internal) increasing returns to scale; the firm's rate of returns to scale decreases when its production increases; reswitching is not allowed;[7] in the case with an infinite number of techniques of production, it is legitimate to represent the economy through an aggregate, 'well-behaved' production function;[8] capital depreciation does not increase when capital is utilised more intensively (Nikiforos, 2013, p. 523).

The assumption of increasing returns to scale but at a diminishing rate, in particular, bears most of the weight for the argument advanced by Nikiforos (2013) that the cost-minimizing utilization rate would depend positively on the *level* of demand. Nikiforos claims that this is not just a "*theoretical sophistry*" (Nikiforos, 2013, p. 530). We agree that his microeconomic model is an important contribution to production theory, and that increasing returns to scale exist in several industries and their implications for firm-level behaviour should therefore be explored. We also think that his approach to the issue of the rate of utilization – starting from the cost-minimization problem of the firm, in the same spirit of Kurz (1986) – is the correct one. However, the assumptions underlying his contribution are overall much more restrictive than the simple (and in our view sensible) process of adaptive expectations defined by equation (5).

## 4. From micro to macro with a logical leap

Importantly, even if all these assumptions held at the microeconomic level for all firms, the passage from Nikiforos (2013) microeconomic model to something like equation (6)

[7] See Dvoskin and Petri (2017) for a recent reappraisal of the relevance of reswitching.
[8] See Felipe and McCombie (2014), whose title (*The aggregate production function: 'not even wrong'*) is a perfect synthesis of the troubles with the use of an aggregate production function.

(that is, the adaptation of the desired rate of utilization to any realized utilization level) involves a further leap. Nikiforos' argument implies that, given the assumptions summarized above, the normal degree of capacity utilisation will increase when the *level* of demand for the firm increases. Therefore, at the firm level, we have $u_n = u_n(Q)$, where Q is the *level* of demand for the individual firm. However, when the analysis moves to the macro level, what we find is an equation according to which the normal degree of utilisation endogenously increases when the current *rate* of accumulation is higher than the expected *rate* (Nikiforos, 2016, p. 456).[9] By a sleight of hand, now the normal utilization rate no longer depends on the *level* of demand at the firm level, but on the growth *rate* of aggregate output. When the economy is on a balanced, equilibrium growth path, the normal degree of capacity utilisation should remain constant. But if we take Nikiforos (2013) model at face value, any increase in the *level* of demand for the firm (for which a positive rate of growth of firm-level output is sufficient, even equal or lower than the expected one) should cause an increase in the normal degree of capacity utilisation.

How is it possible, then, to derive equation (6) (the adjustment mechanism that makes the normal utilization rate converge to the actual one) from Nikiforos (2013) microeconomic model? The answer is that it is not possible, unless one adds a further assumption, which DOP do not make explicit, but that Nikiforos (2016) introduces when discussing the passage 'from micro to macro':

$$\dot{Q} = k(g^{K^*} - \gamma) \tag{7}$$

where Q is *"the demand for the product of the firm"* (Nikiforos, 2016, p. 455), $\gamma$ is the expected accumulation rate of the economy, $g^{K^*}$ is the actual one and k is a positive parameter. What this assumption says is that the change in the average *level* of demand faced by firms depends on the discrepancy between the actual and expected growth *rate* of the economy. This also implies, counterintuitively, that when firms are short on productive capacity,[10] they increase their production faster. This assumption does not seem to have any compelling economic justification, other than the desire to be able to derive a macroeconomic adjustment process that can 'save' the standard Neo-Kaleckian model from its criticisms.

Indeed, there is no reason for changes in firm-level demand to be a function of the difference between actual and expected aggregate growth. Even less for the variation in firm-level output to be equal to 0 when the two rates coincide. A possible way to rationalize these assumptions would be to posit that (a) the rate of growth of the number of firms in the economy is exactly equal to the expected growth rate of the economy and (b) the new firms that are created have the same average size of existing firms. But these assumptions have no economic justification either, especially in a world of increasing returns to scale as the one we are dealing with here, in which existing firms would be able to accommodate the increase in demand at a lower average and marginal

[9] Equation (6) follows smoothly from this relation.

[10] From equation (1), it can be easily seen that when $g^{K^*} > \gamma$, then $u > u_n$.

cost than newly created firms. It is also difficult to imagine how new firms, the moment they are born, could instantaneously reach the average size of existing firms.

Apparently, the burden of the argument here hinges on an empirical consideration: indeed, Nikiforos (2016) justifies equation (7) based on empirical evidence, namely a OLS regression of the change in the average number of employees per firm in the US economy on the lagged deviation of the growth rate of US GDP from a trend growth rate, calculated through the HP filter. It is important to notice that the number of observations included in the regression is 21. We do not see this econometric exercise as a substitute for a reasonable economic justification. However, even abstracting from that, it should be noted that the estimated constant in the regression is positive and significant at the 0.10% significance level, which is inconsistent with equation (7).

In our view, a mechanism of adaptive expectations like the one described in equation (5) is a natural way to close a demand-led model which tries to capture the process through which aggregate supply may adjust to aggregate demand (rather than the other way around). All one needs to assume is that firms revise their expectations based on observed outcomes. There exists considerable empirical evidence in favour of the hypothesis of adaptive expectations (Parkin 2008). The closure proposed by DOP seems instead based on a complex set of arguably ad-hoc assumptions, some of which (most clearly equation 7) appear to have little economic justification.

## 5. Further problems related to the existence of autonomous components of demand

It is worth noting that even if one were to put aside, for the sake of argument, the scepticism about the process through which desired utilization would adapt to the current actual utilization rate, there is a further problematic aspect in the argument of Dávila-Fernández et al. (2017). The authors propose to substitute the 'adaptive expectations' mechanism in Lavoie (2016) (equation 5) with the 'endogenization' of the normal rate of capacity utilization (equation 6). Nevertheless, when they go on to present their alternative solution (section 2.3 in Dávila-Fernández et al., 2017) they suddenly go back to the framework of the standard Neo-Kaleckian model, without autonomous demand. Even if they do not seem to question the existence or the relevance of some components of aggregate demand that do not depend on current or expected domestic income, besides substituting equation (5) with their equation (6) they also implicitly assume away the very existence of autonomous demand.[11] The implicit assumption that no autonomous component of demand even exists turns out to be crucial for their conclusions. In-

[11] Neglecting autonomous demand altogether could be justified by asymptotic considerations, if it is assumed that the growth rate of autonomous demand is lower than the expected growth rate. If the inequality $\gamma > g^z$ held, z would slowly, asymptotically tend to 0, and so would $\dot{z}$ in equation (4). There is no economic reason, however, to assume that the expected growth rate is systematically higher than the growth of autonomous demand. Empirical evidence (Girardi and Pariboni, 2015 and 2016), suggests that, to the contrary, the share of autonomous demand in the economy tends to be sizeable.

deed, if they applied their proposed solution without implicitly and arbitrarily neglecting the existence of autonomous demand, they would have found problematic results. If we use equations (1)-(3) plus equation (6), we end up in a system of two differential equations, which we rewrite here for simplicity:

$$\dot{z} = z(g^Z - g^{K*}) = z[g^Z - \gamma - \gamma_u(u^* - u_n)] \quad (4)$$

$$\dot{u}_n = \alpha(u^* - u_n) \quad (6)$$

It is straightforward to see, by imposing $\dot{z} = \dot{u}_n = 0$, that no equilibrium solution exists, unless the exogenous parameter $\gamma$ coincides, by a fluke, with $g^Z$. The sum of exports and public spending (or whatever other component of demand may not depend on income in the historical context of interest) would need to grow, for some reason, at a rate equal to the constant in the accumulation function. This is not particularly surprising. The presence of an autonomous, fixed component in the accumulation function prevents the full adjustment of productive capacity to aggregate demand.

## 6. Conclusion

In this short note, we have critically examined a recent contribution, put forward in Dávila-Fernández et al. (2017), to the long-lasting debate about alternative Post-Keynesian growth models. The authors of the mentioned article maintain that the endogenization of the normal degree of capacity utilisation is the most appropriate way to achieve the equality between the actual, realized degree of capacity utilisation and the normal one.

We have argued that the argument of Dávila-Fernández et al. (2017) is not convincing for the following reasons. First, their proposed adjustment mechanism (which would make the normal rate of utilization endogenous) is based on a microeconomic model which relies on various rather restrictive assumptions. Second, and probably most important, the derivation of the macroeconomic adjustment mechanism of Dávila-Fernández et al. (2017) from the microeconomic model of Nikiforos (2013) involves a logical leap, that can be justified only by a very peculiar assumption about the relation between the growth rate of the economy and the level of demand, which has no plausible economic justification. Third, even if one puts aside for the sake of argument the perplexities regarding the 'endogenization' of the normal rate of utilization, the existence of autonomous components of demand is sufficient to invalidate their results, as we have shown in this short comment.

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