

Growth Regimes and Structural Dynamics in the Kaleckian Model of Growth and Distribution^{*}

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Abstract

In this paper, we consider that the natural rate of profit is one of the main determinants of investment in a disaggregated version of the Neo-Kaleckian model of economic growth. By adopting a disaggregated approach to this framework, it is shown that the structural economic dynamic is conditioned not only to the patterns of evolving demand and diffusion of technological progress but also to the distributive features of the economy, which can give rise to particular regimes of economic growth. From this perspective, we conclude that a profit-led regime becomes theoretically feasible in a closed economy where the natural rate of profit is one of determinants of investment.

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1. Introduction

The Kaleckian model is based on the growth model that was initially coined by Kaldor (1956) and Robinson (1956, 1962) and extended by Dutt (1984), Fowthorn (1982) as well as by Bhaduri and Marglin (1990). It passes through three main phases, which is integral to its evolution, and are labeled as 'generations'. Kaldor (1956) has built his seminal model on the notion of full capacity utilization, and Dutt (1984) and Fowthorn (1982), through independent works, have advanced what is known as the Neo-Kaleckian or the second generation of the Kaleckian model by endogenizing the rate of capacity utilization in the lines of Steindl (1952). One of the main contributions of this generation is the possibility of disequilibrium and the presence of a stagnationist regime in which an increase in the profit share implies a reduction in capacity utilization. The key assumption behind this result is that the growth rate of investment is a function not only of the profit rate as in Kaldor-Robinson, but also of the rate of capacity utilization.

Bhaduri and Marglin (1990) have challenged this view by considering that the growth rate of investment is a direct function of the profit share instead of the profit rate. According to them, the profit rate has already been implicitly considered in the equation of the growth rate of investment through its relation with the rate of capacity utilization. Thus, a higher rate of capacity utilization induces firms to expand capacity in order to meet anticipated demand while lower utilization induces firms to contract investment. Hence, by substituting the profit rate by the profit share in the expression of the growth rate of investment, which is accomplished in the post-Kaleckian or third generation models, allows us to avoid considering twice the effects of the profit rate on the growth rate of investment. One of the properties of the third generation models, as it became known, is the possibility of a non-stagnationist, or profit led regime in which eventual reduction in consumption due to a lower real wage are overcompensated by an increase in investment led by a profit share expansion.

The emergence of a profit led regime is certainly an improvement brought by the formulation of Bhaduri and Marglin (1990) investment function. Empirical evidence shows that the occurrence of this regime is a reality in more open economies [see e.g. Hein and Vogel (2008), Ederer et al. (2009), Naastepad and Storm (2007) and Eder and Stockhammer (2008)]. But as pointed out by Lavoie (2010, p. 133), "a drawback of this function is that it is not clear why investing entrepreneurs would care about the profit share, in contrast to the profit rate." He concludes that "[a] way out to argue is that investment depends on expected profitability, computed at normal prices, based on the normal rate of capacity utilization."

But the concept of expected profitability, computed at normal prices, based on the normal rate of capacity utilization is conveyed by the (expected) normal rate of profit rather than either the actual rate of profit [see Lavoie (2003)] or the profit share. But if this view is correct, the profit rate should be replaced by the normal profit rate and not by the profit share as one of the determinants of the growth rate of investment. This view is also according to the writings of Joan Robinson, for whom, the profit rate should provide both the motive and the means to capital accumulation. Besides, Robinson's (1956, 1962) concept of 'normal' rate of capacity utilization is related to the degree of utilization of productive capacity that producers consider as ideally suited to fulfill demand requirements.

In the present paper, we intend to contribute to this debate by proceeding to a multi-sectoral assessment of the Kaleckian model [see Araujo and Teixeira (2015)]. Authors such as Dutt (1997) and Park (1995) have already approached the Neo-Kaleckian model in presence of more than one sector. Park (1995) has concluded that such formulation suffers from the over-determination problem in the sense that the equalization of the rate of profits between sectors produces more independent equations than variables. Dutt (1997) claims that Park's analysis is not correct in as much as he could not specify particular investment function for

each sector. With the assumption of an aggregate investment function in which the rate of profit is equalized between the two sectors, he avoids the problem of over determinacy in the long-run, by showing that a disaggregated assessment of the Neo-Kaleckian framework is feasible[§].

Here we pursue this research line but following a different route. Departing from the idea that the Kaleckian may be seen as a particular case of Pasinetti's model [see Araujo and Teixeira (2015)] we show that Neo-Kaleckian analysis may be carried out in a higher degree of disaggregation due to the device of vertical integration. Such approach allows us to introduce the concept of the normal profit rate in the Kaleckian model, which coincides with the concept of natural rate of profit as coined by Pasinetti (1981). According to this author, a natural rate of profit emerges as a natural requirement to endow the economic system with the necessary productive capacity to fulfil the demand expansion. Therefore, a growing economy does imply a natural rate of profit, and this fact allows us to take into account the roles that the profit rate should play in the investment function, as emphasized by Robinson (1962). Accordingly, with this approach we intend to consider not only the motive but also the means to promote capital accumulation as one of the determinants of investment.

Hence, the first contribution of this paper is to consider the natural rate of profit as one of determinants of investment. By following this route, we show the possibility of the existence of a profit led regime even in the second generation of the Kaleckian model^{**}. Notwithstanding, a wage led regime is shown to be the most probable outcome in a closed economy, with the growth rate of demand being the crucial variable to establish this result. Sectors with a positive growth rate of demand work under a wage led regime, while sectors with a negative growth rate of demand, below a threshold value, work under a profit led regime.

Besides, another important development that our approach brings to the Kaleckian model is the possibility of considering that different sectors operate under different regimes. If one sector is under a 'stagnationist' regime, then an increase in the wage share may bring an increase in the demand of the final good produced by that sector. This fact shows that the structural economic dynamics is conditioned not only to patterns of evolution of demand and diffusion of technological progress but also on the distributive features of the economy, which can give rise to different regimes of economic growth.

This paper is structured as follows: in the next section, we show that a multi-sectoral assessment of the Kaleckian model, following the Pasinettian lines, is possible due to vertical integration. Therefore, we may borrow the concept of the natural profit rate developed by Pasinetti and include it as one of the determinants of the investment decisions. Section 3 shows that the wage led is the most probable outcome in this set-up and section 4 concludes.

[§] Both Park (1995) and Dutt (1997) have assumed the existence of two sectors, namely, a consumption and an investment good sectors. Such framework weakens the multi-sectoral nature of the analysis in as much as one of them, namely the consumption good, relies on the production of the other, the investment sector. It is a well-known result from the Feldman-Mahalanobis [see Araujo and Teixeira (2002)] bi-sector model that both sectors grow at the same rate in the long run. The analysis presented here is more inclusive in the sense that there are an arbitrary number of sectors that are vertically integrated, thus allowing that each sector grow at a particular rate.

^{**}The possibility of a non-stagnationist regime in the second generation was also obtained by Taylor (1990), given that workers are allowed to save. [See Blecker (2002)].

2. A Brief Assessment of the Kaleckian Model

The standard Kaleckian model assumes there are a one-sector closed economy that produces only one type of good that can be used as consumption and capital goods. Technology is characterized by fixed coefficients. Likewise, there are constant returns to scale. There is no government, and the financial sector is not taken into account. All firms are equal in the sense that they wield no differences in market power. In such an economy, the value of net aggregate output, namely pX , is equal to the sum of the wages, wN , and profits, rpK : $pX = wN + rpK$, where p is the price level, X is the level of real output, w is the nominal wage rate, N is the level of labour employment, r is the rate of profit and K is the stock of capital. Now, define $l = \frac{N}{X}$ as the labour per unit of output, $v = \frac{K}{X_{fe}}$ as the capital-output

ratio and $u = \frac{X}{X_{fe}}$ as the rate of capacity utilization, where X_{fe} stands for the full employment

output. By using this notation, it follows that $\frac{K}{X} = \frac{v}{u}$. Assuming that v is constant and

normalized to one, we can rewrite previous expression as: $p = wl + rpu^{-1}$. Let us assume that prices are given by a mark-up rule over wage, according to $p = (1 + \tau)wl$, where τ is the mark-up rate. After simple algebraic manipulation – by substituting the mark up rule for p into the previous expression – and under the hypothesis that $v = 1$, allows us to obtain the following relationship between the profit share, the rate of profit and the rate of capacity utilization: $r = \pi u$. Implicit in this result is the fact that the profit share is given by $\pi = \frac{\tau}{(1 + \tau)}$. This formulation gives us the profit rate from the supply side of the model.

In order to develop the exposition, let us focus on the Neo-Kaleckian or second generation version of the Post-Keynesian model, as advanced by Dutt (1984) and Fowthorn (1982). We adopt this approach in order to emphasize that even in this generation it is possible to obtain a profit led regime when the natural rate of profit is considered as one of the determinants of investment. In this model, capacity utilization is now depicted as an endogenous variable that can be different from full capacity utilization. Such understanding gives rise to the main difference in relation to the original Kaldor and Robinson approaches: the variable measuring capacity utilization enters the growth rate equation of investment. It means that the higher the rate of capacity utilization, the higher the growth rate of investment [Steindl (1952)], the latter being found in the expression: $g_i = g_o + \alpha r + \beta u$. The growth rate of savings is given by the Cambridge Equation, where the workers are not supposed to save, namely $g_s = sr$. By substituting $u = r\pi^{-1}$ into the growth rate of investment, and by equalizing this expression to the growth rate of savings, given by the Cambridge equation, we conclude after some algebraic manipulation, that the profit rate is given by:

$$r^* = \frac{\pi g_o}{\pi(s - \alpha) - \beta} \quad (1)$$

Substituting this result into the relation $u^* = r^* \pi^{-1}$ we obtain the rate of capacity utilization given by:

$$u^* = \frac{g_o}{\pi(s - \alpha) - \beta} \quad (2)$$

By inserting (1) into the Cambridge equation, namely $g_s = sr^*$, we obtain the equilibrium growth rate of the economy:

$$g^* = \frac{s\pi g_o}{\pi(s - \alpha) - \beta} \quad (3)$$

Taking the derivatives of expressions (1) and (3) with respect to the profit share, π , we conclude respectively that:

$$\frac{\partial r^*}{\partial \pi} = -\frac{g_o \beta}{[\pi(s - \alpha) - \beta]^2} < 0 \quad (4)$$

$$\frac{\partial g^*}{\partial \pi} = -\frac{s g_o \beta}{[\pi(s - \alpha) - \beta]^2} < 0 \quad (5)$$

This result shows that a redistribution of income towards wages may result in a higher rate of capacity utilization, as shown by Blecker (1989) and it is known in the literature as the ‘stagnationist view’ or wage led regime. Another important feature of this approach is that the profit rate plays a role in the investment decisions in two different ways; that is, it has a direct impact on investment decisions, which was also considered by Kaldor and Robinson, and an impact through its effect on the capacity utilization. By considering that $u = r\pi^{-1}$, it is implicitly assumed that increasing capacity utilization is related to an increasing profit rate. For this reason, Amadeo (1986a, 1986b) omits the realized rate of profit and only includes the rate of capacity utilization in the investment equation, obtaining essentially the same results as Dutt (1984) and Fowthorn (1982).

However, to consider the actual rate of profit as one of the determinants of the investment may well be subject to a more fundamental criticism. Arguably, entrepreneurs cannot make future plans based on a variable, namely the actual rate of profit, which does not take into account the expected profitability or the over-utilization of capital. The scepticism that the rate of profit plays the role in the investment function as emphasized, is also highlighted by authors such as Foley and Michl (1999, p. 178). According to them: “[w]e must be careful about the interpretation of the rate of profit in this equation. Robinson argued that the actual rate of profit would provide entrepreneurs with a forecast about the future, only if it is persisted at a stable level for some time. Thus, the Robinsonian investment equation is not meant to be true instantaneously but only after the economy has been in a stable position for some time, so that the actual rate of profit accurately reflects the expected rate of profit”.

It is worth to mention that the normal rate of profit, according to the neo-Ricardian view, is used by the entrepreneurs to base their decision to invest and has a close relation with the concept of the normal rate of capacity utilization. The view that the degree of productive capacity utilization, as normal or planned, is relevant in order to determine normal prices and the general rates of profit, is emphasized by Vianello (1989). According to him, the “normal, or ‘planned’ degree of utilization of productive capacity is the only one compatible with the conception of normal prices as ‘central ones’, and the guiding lights for investment decisions”. In this view, the normal rate of profit represents ‘the guiding light for investment and pricing decisions, cannot possibly be either an abnormally high or an abnormally low one’ (Vianello, 1989, p. 84).

But the actual profit rate that enters the investment equation in the Neo-Kaleckian model does not fully convey these roles. Firstly, there is no guarantee that this variable will reflect the trends of growing or stagnating demand in a particular economy. Secondly, it is a function just of the capitalist propensity to save since its derivation departs from the

Cambridge theorem. No parameters related to the consumption of workers determine it. In a one-sector model, in which workers are assumed not to save, this may not seem to be a serious shortcoming since not only the intertemporal workers' decision on consumption but also the decisions of consumption amongst different types of goods are completely ignored.

3. The Role of the Natural Rate of Profit on the Investment Function from a Multi-Sectoral Standpoint

Though the main focus of the Pasinettian approach is on the structural economic dynamics, his analysis also includes a macroeconomic determination of economic growth. His approach is carried out, not in terms of input-output relations, as has become common in multi-sector models, but in terms of vertically integrated sectors. This device is used to focus on final commodities rather than on industries. In this case, it is possible to associate each commodity to its final inputs – a flow of working services and a stock of capital goods – thus eliminating all intermediate inputs. From this point of view, such framework may be adopted to the theoretical treatment of the Kaleckian model, although the latter does not consider the distinction between capital and consumption goods, that is, only one commodity is produced. This view is also supported by Bhaduri and Marglin (1990, p.377), according to whom, in the Kaleckian model “we can think of the representative firm as vertically integrated using directly and indirectly a constant amount of labour per unit of final output.”

Hence, the starting point of the present analysis is to consider an economy that consists of vertically integrated structure. As pointed out by Lavoie (1997, p. 453), “the concept of vertical integration, although extensively but implicitly used in macroeconomic analysis, has always been difficult to seize intuitively”. What is behind this affirmation is that models that are aggregated in one or two sector are based on the device of vertical integration. This range of vision is confirmed by Scazzieri (1990, p.26) for whom “[a]ny given economic system may generally be partitioned into a number of distinct subsystems, which may be identified according to a variety of criteria. However, the utilization of subsystems for the analysis of structural change is often associated with the consideration of subsystems of a particular type. These are subsets of economic relationships that may be identified by the logical device of *vertical integration (...)*”. Hence, it is possible to view the Kaleckian model as a vertically integrated model because it has the same characteristics of what Sraffa (1960, appendix A) has called sub-systems – i.e. it is self-reproducible and it uses no intermediate goods to produce a single commodity.

In our viewpoint, the main issue related to the use of vertical integration in the Kaleckian model is associated with the fact that this device is used to its extreme, giving rise to an economy aggregated in one sector, which does not allow performing a proper analysis of some important issues related to the structural economic dynamics. Here, we consider that a multi-sectoral version of the Kaleckian model could highlight some sectoral issues that can be dealt with only in a disaggregated set up but avoiding cumbersome inter-industrial relations.

A possible starting point to establish a bridge between the two approaches is to consider the relationship $r = \pi u$ in a multi-sectoral environment. This was proved by Araujo and Teixeira (2015) by departing from Pasinetti's model and argue that since, vertically integrated ‘industries’ are merely weighted combinations of real industries [Steedman (1992, p. 149)], it is possible to associate to each sector a profit share, a rate of capacity utilization and a rate of profit, and to establish a relation among these variables in a multi-sectoral economy.

Assuming that $u_i = \frac{X_i}{K_i}$, the relationship $r = \pi u$ remains valid for a multi-sectoral economy but now it has to take into account that π_i is the sectoral profit share and u_i is the sectoral rate of capacity utilization. This can be proved by considering that by definition, the sectoral profit share is given by: $\pi_i = \frac{p_i r_i K_i}{p_i X_i}$. By multiplying and dividing by X_i^{fe} , the full employment sectoral output of the i -th sector, we obtain $\pi_i = r_i \frac{X_i^{fe}}{X_i} \frac{K_i}{X_i^{fe}} = r_i u_i^{-1} v_i$. By assuming that $v_i = 1$, and rearranging the terms we obtain: $r_i = \pi_i u_i$. This result will be used below in order to set a value of the mark-up rate relative to the natural rate of profit.

The dynamic equilibrium of capacity utilization requires that $\dot{K}_i = \dot{X}_i$, where the dot stands for the time derivative. But from the Pasinettian model (1981) we know that the equilibrium amount of physical quantity is $X_i = a_{in} X_n$, where a_{in} is the demand coefficient for the i -th good and X_n refers to total labour force. It implies that $\dot{X}_i = (\theta_i + \xi) X_i$ where ξ is the growth rate of population and θ_i is the growth rate of demand. Besides, the change in the stock of capital of i -th sector is given by the sectoral investment, according to $\dot{K}_i = x_{kin} = a_{kin} X_n$. Hence, $\dot{X}_i = \dot{K}_i$ implies that: $a_{kin} X_n = (\theta_i + \xi) X_i$. It follows that $a_{kin} = (\theta_i + \xi) \frac{X_i}{X_n}$. In equilibrium, supply is equal to demand in each sector, namely $X_i = K_i$, and we can rewrite the latter formulae as: $a_{kin} = (\theta_i + \xi) a_{in}$.

This expression may be interpreted as follows: it shows the level of investment needed to guarantee that the i -th sector will be endowed with the amount of capital goods necessary to produce the amount of final goods required by an increase in the labour force and per capita demand. If $a_{kin} > (\theta_i + \xi) a_{in}$, the i -th sector will face deficit of capital utilization while if $a_{kin} < (\theta_i + \xi) a_{in}$, the i -th sector will not be able to produce the amount of consumption goods that are required by consumer requirements.

In this vein, the Pasinettian approach provides us with the concept of natural rate of profit; that is, a rate of profit that must be adopted in order to endow each sector with the capital goods required to allow each sector to at least fulfil the demand requirements of that sector with no capacity excess. This rate is given by: $r_i^n = \xi + \theta_i$. Note that if $r_i^n < \xi + \theta_i$, then capitalists in the i -th sector will not have the necessary amount of resources to invest in such sector in order to meet the expansion of demand. If $r_i^n > \xi + \theta_i$, capitalist will overinvest in the i -th sector; thereby, leading to excess of productive capacity.

As pointed out by Pasinetti (1981), the proportionality between the rate of profit and the sectoral rate of growth emerges as a natural requirement to endow the economic system with the necessary productive capacity to fulfil the expansion of demand. Therefore, a growing economy does imply a natural rate of profit, which is given by: $r_i^n = \xi + \theta_i$. In this vein, the concept of 'natural rate of profit', introduced by Adam Smith (1776), is reinterpreted by Pasinetti (1981, 1988). Whereas, the former argues that – due to the competition amongst capitalists – the ordinary rate of profit – in the long run – is uniform across sectors, Pasinetti (1981, p. 130) postulates that “there are as many natural rates of profit as there are rates of expansion of demand (and production) of the various consumption goods.”

A possible interpretation of the disparity between the Pasinettian and Smithian concept of the 'natural rate of profit' is that the former is a warranted rate of profit that when adopted allows to endow each sector with the units of productive capacity necessary to fulfil demand requirements. The actual rate of profit does not necessarily lead to equilibrium in all sectors. Some of them may operate with less capital goods than what is required and others may operate with excess of capacity utilization.

However, it is essential to stress the importance of establishing a theory of natural prices in the Neo-Kaleckian framework. According to Nell (1989, p. 163), "Kalecki's theory of effective demand requires a theory of 'normal prices', independent of the short-period changes studied by that theory. These prices are required to establish the level of normal capacity utilisation and the realization of profits. Moreover, the normal rate of profit is required in order to study the problem of the choice of technique."

It is important to bear in mind that the Pasinettian model has a strong normative flavour; that is, it shows the requirements for an economic system to be in equilibrium but it does not say that this equilibrium prevails. Besides, when moving from a one sector to a multi-sectoral treatment of the growth process, it allows us to consider dimensions of the consumer choice that cannot be taken into account in a one-sector model, where the only possibility of substitution occurs between current and future consumption. Hence, when we move to a multi-sectoral model, a key change arises: workers may choose different patterns of consumption, according to the evolution of their preferences. In this case, a conventional version of the Kaleckian model, in which actual rate of profit enters the sectoral investment equations, enables us to take the patterns of consumption into consideration. Therefore, the actual profit rate that enters the sectoral growth rate of investment fails to take into account the evolution of workers' preferences. It is of paramount importance to consider the natural rate of profit instead.

In this regard, even a sectoral profit rate would not convey any information about the prospective evolution of workers' preferences. As a consequence, it does not provide any information about the expected profitability of a specific sector. If in a particular sector, for instance, the growth rate of demand is above the growth rate of demand in other sectors this information may not be conveyed by the actual rate of profit. In this sense, we believe that the actual rate of profit does not fully provide the motive to capital accumulation, as emphasized by Joan Robinson.

Meanwhile, it is also possible to show that the actual profit rate does not provide the means too. Due to the failure of this concept to fully take into account the growth rate of demand, it may be fixed at a level below or above to the one required to endow the capitalist class with the required funds to reinvest, fulfilling the expansion of demand in a specific sector. In this context, considering the actual rate of profit as a mean to endow the capitalists with the necessary funds to reinvest may result in a situation in which they will have less capital than what is necessary to invest in a sector to fulfil the demand requirements.

Arguably, this possibility is even more plausible if we are dealing with a growing multi-sector economy in which the dynamics of demand are determined by the Engel's Law. In this regard, by considering the concept of natural rate of profit as advanced by Pasinetti as an alternative to the actual rate of profit, we include a variable in the investment equation that plays exactly the roles emphasized by Joan Robinson, namely both the motive and the means to promote capital accumulation. Hence, we consider a more reliable concept to convey the roles of rate of profit in the investment equation, namely the natural rate of profit. Then the investment equation may be written as:

$$g_I^i = g_o^i + \alpha_i r_i^n + \beta_i u_i \quad (6)$$

Where g_i^i stands for the investment in the i -th sector normalized by the stock of capital in such sector. $\alpha_i > 0$ measures the influence of the investment in the i -th sector to the sectoral profit rate, r_i , and β_i measures the sensibility of the sectoral investment to the sectoral capacity utilization, u_i , which captures the accelerator effect. A high rate of capacity utilization induces firms to expand capacity more rapidly in order to keep up with the anticipated demand in the i -th sector. According to this view, firms take into account the natural rate of profit while still responding to the actual rate of profit through its relation to the measure of capacity utilization. By adopting this specification, we obtain the following solutions for the equilibrium values of the actual profit rate, the rate of capacity utilization, and the sectoral growth rate, respectively:

$$r_i^* = \frac{\pi_i [g_o^i + \alpha_i (\xi + \theta_i)]}{\pi_i s - \beta_i} \quad (7)$$

$$u_i^* = \frac{g_o^i + \alpha_i (\xi + \theta_i)}{\pi_i s - \beta_i} \quad (8)$$

$$g_i^* = \frac{s \pi_i [g_o^i + \alpha_i (\xi + \theta_i)]}{\pi_i s - \beta_i} \quad (9)$$

These expressions show that the higher the growth rate of demand, in a particular sector, the higher the profit rate, as well as the rate of capacity utilization and the growth rate of the i -th sector. These results may be rationalized as follows. In order to fulfil a higher rate of demand, a higher rate of profit is necessary to provide capitalists with the funds to reinvest.

In this formulation we assume that $S = I_i$ in the short run. This is a reasonable assumption in as much as in the Kaleckian theory an oligopolistic or a monopolistic competition is best suited to describe the industrial sector of the economy. To the extent that one of the characteristics of the monopoly power is barriers to the mobility of capital, the existence of such power prevents a fast flow of capital amongst sectors which implies that in the short run the investment in the i -th sector, can be performed only by entrepreneurs of such sector. In this case, $I_i \leq S_i$. But the entrepreneur of the i -th sector cannot invest in another sector due to the same reasoning. Since we do not consider the existence of other assets in such economy^{††}, we can guarantee that the equality $I_i = S_i$ holds in the short. Hence in a capitalist economy the classical view of competition has to be replaced by the acknowledgment of the existence of barriers to the mobility of capital that prevents the equalization of the rate of profit across the sectors. With this respect, Dutt (1990, p. 150) states that “(..) the laws of competition had to be replaced by the laws of regulation by monopoly power in theoretical analysis.”

But if one on hand, the existence of monopoly power challenges the classical laws of competition, on the other hand the Smithian (classical) postulate that in the long run the rate of profit is uniform across sectors is not incompatible with the short-run Neo-Kaleckian view that innovation leads to monopoly power. The tendency towards a uniform rate of profits is the basic principle of the classical view of competition – and principles are invariant in space

^{††} If we had assumed the existence of other financial assets their influence on the investment should be taken into account in expression (6) [See e.g. Hein (2014)].

and time, and, as such, always hold. However, the historical-empirical realisation of principles may be enhanced or obstructed by various factors. [see Bortis (2003)].

A possible way of conciliating the Kaleckian and the classical views is to take into account the Duménil and Lévy (1999) view “that one should be Kaleckian or Keynesian in the short run, but classical in the long run” [Lavoie (2010, p. 144)]. This is in fact the Sraffian standpoint and for the purposes of present paper this range of view provides us with the mathematical requirements to establish the values of the relevant variables, namely the profit rate, the rate of capacity utilization and the growth rate in the short run. But it is important to bear in mind that other interpretations are available. In the Kaleckian view for instance the long run is considered to be just a sequence of short runs [Kalecki (1971, p. 165)] and in this vein the above mentioned equality, namely $S = I_i$, can be taken as granted in each succession of short runs.

By taking the derivative of the sectoral rate of profit and the sectoral growth rate, we conclude that the signs of the two derivatives below rely on the relation between the sectoral growth rate of demand and other parameters of the model:

$$\frac{\partial r_i^*}{\partial \pi} = -(a_{ni}a_{in})^{-1} \frac{\beta_i [g_o^i + \alpha_i (\xi + \theta_i)]}{(\pi_i s - \beta_i)^2} > 0 \quad (10)$$

$$\frac{\partial g_i^*}{\partial \pi} = (a_{ni}a_{in})^{-1} \frac{s [g_o^i + \alpha_i (\xi + \theta_i)]}{(\pi_i s - \beta_i)^2} > 0 \quad (11)$$

Note that if $\theta_i > -\left(\frac{\alpha}{\beta_i} + \xi\right)$, then the numerator is positive and we face a wage led growth regime. If $\theta_i < -\left(\frac{\alpha}{\beta_i} + \xi\right)$, then the numerator is negative and we have a profit led growth regime. Therefore, we can conclude that for sectors with a positive growth rate of demand operate in a ‘stagnacionist’ regime. In fact, even if the growth rate of demand is negative but above the threshold level $-\left(\frac{\alpha}{\beta_i} + \xi\right)$, it leads the sector to work in a wage led regime. Only the case in which the growth rate of demand is smaller than $-\left(\frac{\alpha}{\beta_i} + \xi\right)$, the sector operates under a profit led regime.

Hence, it is important to emphasize that the most probable outcome is the wage led regime since the profit led regime requires not only a negative growth rate of demand but one that is lower than the combination of parameters given by $-\left(\frac{\alpha}{\beta_i} + \xi\right)$. The prevalence of wage led regime in small and closed economies is in accordance with the empirical evidence presented by a number of authors, such as Hein and Vogel (2008), Ederer, Onaran, and Stockhammer (2009), Naastepad and Storm (2007) and Ederer and Stockhammer (2008). It follows here that by taking into account the natural rate of profit as one of the variables driving investment, we are able to provide further basis to this empirical evidence.

4. Concluding Remarks

One of the key distinctions between the orthodox view [see e.g. Solow (1956)] and the Kaleckian model is the importance given to the supply and demand determination of economic

growth. While the later focuses on demand, the former stresses the supply side as determinant of the process of economic growth. But this is not the only difference between these two approaches. The dominant neoclassical literature on economic growth is inadequate to deal with structural change issues since its frameworks cannot take into account the complexities of the innovation process and demand conditions particular to sectors of the economy.

However, what is known as the original Kaleckian model is actually subject to the same criticism as the Neoclassical model since both models are aggregated in one sector. Here in order to overcome this limitation of the Kaleckian model, we have introduced a disaggregated approach in which the natural rate of profit is seen as one of determinants of investment. By following this approach, it was possible to consider particular dynamics for each sector. The results show that sectors with a positive growth rate of demand operate under a wage led demand regime, which is consistent with empirical findings for a closed economy.

In fact, we learn from this analysis that the actual structural dynamics depends ultimately on the distributive features of the economy and not only on the evolution patterns of demand and technological progress, as in the Pasinettian view. In the present paper, what is being offered is a vision of a Post-Keynesian approach to conceptualize growth based on the principle of effective demand, in which each individual Post-Keynesian traditions – Kaleckian and Pasinettian – can be shown to be consistent. This is a step further in order to build a unified Post-Keynesian theory of economic growth.

Appendix

In order to determine the signs of $\frac{\partial r_i^*}{\partial \pi}$ and $\frac{\partial g_i^*}{\partial \pi}$ let us adopt the chain rule and consider that:

$$\frac{\partial r_i^*}{\partial \pi} = \frac{\partial r_i^*}{\partial \pi_i} \frac{\partial \pi_i}{\partial \pi} \quad (\text{A1})$$

$$\frac{\partial g_i^*}{\partial \pi} = \frac{\partial g_i^*}{\partial \pi_i} \frac{\partial \pi_i}{\partial \pi} \quad (\text{A2})$$

From expressions (7) and (9) we obtain:

$$\frac{\partial r_i^*}{\partial \pi_i} = - \frac{\beta_i [g_o^i + \alpha_i (\xi + \theta_i)]}{(\pi_i s - \beta_i)^2} > 0 \quad (\text{A3})$$

$$\frac{\partial g_i^*}{\partial \pi_i} = \frac{s [g_o^i + \alpha (\xi + \theta_i)]}{(\pi_i s - \beta_i)^2} > 0 \quad (\text{A4})$$

In order to find $\frac{\partial \pi_i}{\partial \pi}$ let us define the aggregate profit share as: $\pi = \sum_{i=1}^{n-1} a_{ni} a_{in} \pi_i$. Then after some algebraic manipulation we can rewrite the sectoral profit share as: $\pi_i = (a_{ni} a_{in})^{-1} [\pi - \sum_{\substack{j=1 \\ j \neq i}}^{n-1} a_{nj} a_{jn}]$. Then we conclude that:

$$\frac{\partial \pi_i}{\partial \pi} = (a_{ni} a_{in})^{-1} \quad (\text{A5})$$

Hence by inserting (A3), (A4) and (A5) into expressions (A1) and (A2) we obtain expressions (10) and (11).

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