The Growth Regimes Consistent with A Structural Economic Dynamic Approach to the Neo-Kaleckian Model

Joanílio Rodolpho Teixeira Ricardo Azevedo Araujo**[[1]](#footnote-1)\***

Department of Economics Department of Economics

University of Brasilia, Brazil University of Brasilia, Brazil

**Abstract**

Following the insight that profits influence investment not only providing the motive for it but also the means, we consider the natural rate of profit as one of the determinants of investment in a disaggregated version of the Neo-Kaleckian approach to economic growth. By adopting this approach it is shown that the structural economic dynamics 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 it is possible to conclude that a wage-led regime is the most probable outcome in a closed economy where the natural rate of profit is one of determinants of investment.

**Keywords:** Post-Keynesian growth model, structural change, multi-sector models.

**JEL Classification:** E21, O11.

**1. Introduction**

The Post-Keynesian growth model – PKGM hereafter – designates the growth model that was initially coined by Kaldor (1956) and Robinson (1956, 1962) and extended by Dutt (1984), Rowthorn (1982) as well as by Bhaduri and Marglin (1990). Integral to its evolution the PKGM passes through three main phases that are labeled as ‘generations’. Although Kaldor (1956) has built his seminal model on the notion of full capacity utilization, Dutt (1984) and Rowthorn (1982), working independently, have built what is known as the Neo-Kaleckian or the second generation of the PKGM 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 not only of the profit rate but also of the profit share. 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. This is given by *r* = *πu*, where *r* is the profit rate, *π* is the profit share and *u* is the rate of capacity utilization. Hence , and the profit rate is considered twice in the investment growth function given by, where denotes the growth rate of investment, *go* > 0 stands for the growth rate of autonomous investment, *α* > 0 measures the influence of the investment to the profit rate, *r*, and *β* > 0 measures the sensibility of the growth rate of investment to the capacity utilization and captures the accelerator effect. Thus a high rate of capacity utilization induces firms to expand capacity in order to meet anticipated demand while low 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 third generation allows us to write the growth rate of investment as: , where *π* denotes the profit share. By using this formulation it is possible to avoid not only to consider twice the effects of the profit rate on the growth rate of investment but also to change the role of coefficient *α* in the investment growth function. Now it measures the influence of the investment to the profit rate, namely *π*. One of the properties of the third generation model, as it became known, is the possibility of a non-stagnationist, or profit led regime in which eventual falls in consumption due to a lower real wage are overcompensated by an increase in investment led by a profit share expansion.

Since then a number of studies addressing the question of determining the growth regime – profit led or wage led – has arisen [see e.g. Hein and Vogel (2008), Ederer et al. (2009), Naastepad and Storm (2007) and Elder and Stockhammer (2008)]. Although the disparity of findings, the results tend to support the view that while small and closed economies are more prone to be wage led, larger and more open economies tend to be profit led. If on the empirical front a number of authors focused on the determination of the growth regime, on the theoretical front, few papers intend to provide rationale for these results. One exception is Sasaki (2012), who presents a long-run version of the Kaleckian model to investigate which regime is obtained. The author concludes that the long-run equilibrium in the second generation is neither wage-led nor profit-led growth, meaning that the redistribution of income does not play any role in the growth process. The long-run equilibrium in the third generation is shown to be profit-led.

In the present paper we intend to contribute to this debate by proceeding to a multi-sectoral assessment of the Neo-Kaleckian model [see Araujo and Teixeira (forthcoming)]. Considering such framework as a particular case of Pasinetti’s model allows us to introduce the concept of the natural rate of profit in the PKGM, a research line that Sebastiani (1989, p xiv) considers one of the most relevant topics for this literature: “the need to complete the Kaleckian scheme with a theory of the rate of profit and of normal prices is made even more urgent by the necessity to confront the problem of normal productive capacity (…)”. This view is confirmed by Nell (1989, p.163) who states that “Kalecki’s approach implicitly rests on the relationship between the rate of profit and normal prices, and to be complete requires a theory of the determinants of the rate of profits”.

The critique of the Kaleckian investment function on neo-Ricardian grounds is in fact not new. The main focus of their criticism relies on the role of current rate of profit as conveying expected profitability in the investment function. According to them, the investment function should depend on the (expected) normal rate of profit rather on the actual rate of profit. [see Lavoie (1995, p. 796)]. The basis to this view may be found in the writings of Joan Robinson. According to her, the profit rates 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 that degree of utilization of productive capacity that producers consider as ideally suited to fulfill demand requirements.

This view coincides with the concept of natural rate of profit as coined by Pasinetti (1981). According to him it 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, 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 determinants of investment. Hence the first contribution of this paper rests in considering the natural rate of profit as one of determinants of investment. By following this route we show the possibility of existence of a profit led regime even in the second generation [see by Dutt (1984) and Rowthorn (1982)] of the PKGM. A similar result was obtained by Taylor (1990) in the second generation if workers are allowed to save. [See Blecker (2002)]

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. It is shown that sectors with a positive growth rate of demand work under a wage led while sectors with a negative growth rate of demand, below a threshold value, work under a profit led regime. Another important improvement that our approach brings to the PKGM is the possibility of considering that different sectors operating under different regimes. If one sector is under a ‘stagnationist’ regime, then an increase in the wage share of the sector may bring an increase for 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 that 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 PKGM following the Pasinettian lines is possible due to the device of vertical integration. With this in mind, we may borrow the concept of the natural profit rate by Pasinetti to 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.

**2. An Assessment of the PKGM from a Multi-sector Viewpoint**

The main assumptions behind the PKGM are noted: the economy is closed and produces only one good that can be both a consumption as well as a capital good. Technology is characterized by fixed coefficients. Likewise, there are constant returns to scale. There is no government, and the monetary side is ignored. 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*:, 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  as the labour per unit of output,  as the capital-output ratio and  as the rate of capacity utilization, where *Xfe* stands for the full employment output. By using this notation it follows that . Assuming that *v* is constant and normalized to one we can rewrite previous expression as: . Let us assume that prices are given by a mark-up rule over wage according to , where  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 , allows us to obtain the following relationship between the profit share, the rate of profit and the rate of capacity utilization: . Implicit in this result is the fact that the profit share is given by. 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 Rowthorn (1982). We adopt such approach because 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: , wheredenotes the growth rate of investment, *go* > 0 stands for the growth rate of autonomous investment, *α* > 0 measures the influence of the investment to the profit rate, *r*, and *β* measures the sensibility of the growth rate of investment to the capacity utilization, *u*, which captures the accelerator effect. A high rate of capacity utilization induces firms to expand capacity more rapidly in order to keep up with anticipated demand. The growth rate of savings is given by the Cambridge Equation in which workers are not supposed to save, namely . By replacing 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:

 (1).

Replacing this result into the relation  we obtain the rate of capacity utilization given by:

 (2).

By inserting (1) into the Cambridge equation, namely, we obtain the the balanced growth rate of the economy:

 (3).

Taking the derivatives of expressions (1) and (3) in relation to the profit share, namely *π*, we conclude respectively that:

 (4).

 (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 is known in the literature as the ‘stagnationist view’ or wage led regime. Another important feature of this approach it that the profit rate plays a role on the decisions of investment in two different ways: it has a straight 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  then 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 Rowthorn (1982).

However, to consider that the actual rate of profit is 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, that does not take into account neither the expected profitability nor the over-utilization of capital. The scepticism in relation to the rate of profit being able to play the roles emphasized by Robinson in the investment function is emphasized 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 the one which entrepeneurs will base their decision to invest and that has a close relation with the concept of the normal rate of capacity utilization. The view that the degree of utilization of productive capacity relevant to the determination of normal prices and the general rates of profits is the normal, or planned, one is emphasized by Vianello (1989, p. 174). 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, (1985, 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 and 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 workers consumption 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**

The main focus of the Pasinettian approach is on the structural economic dynamics but his analysis includes also a macroeconomic determination of economic growth. His approach is carried out, not in terms of input-output relations, as has become usual 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 approach the PKGM although the latter does not consider the distinction between capital and consumption goods: only one commodity is produced. This view is also supported by Bhaduri and Marglin (1990, p.377) for whom in the PKGM “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 that the Post-Keynesian structure is a vertically integrated model in which this device was used to its limit. 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 PKGM 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 only a single commodity.

In our viewpoint the main issue related to the use of vertical integration in the PKGM is related to the fact that this device is used to its extreme giving rise to an economy aggregated in one sector that 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 PKGM 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  in a multi-sectoral environment. This was proved by Araujo and Teixeira (forthcoming) by departing from Pasinetti’s model and it indicates that since vertically integrated ‘industries’ are merely weighted combinations of real industries [Steedman (1992, p. 149)] it is possible to particularize 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  the relationship  remains valid for a multi-sectoral economy but now it has to take into account that  is the sectoral profit share and  is the sectoral rate of capacity utilization[[2]](#footnote-2). Note that if  then the *i*-th sector experiences full capacity utilization. The dynamic equilibrium of capacity utilization requires that , where the dot stands for the time derivative. But we know that the equilibrium amount of physical quantity is  which implies that  where *g* is the growth rate of population and ** 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 . Hence  implies that: . It follows that . In equilibrium, supply is equal to demand in each sector, namely *Xi* = *xin*, and we can rewrite the latter formulae as:.

This expression may be interpreted as follows: it shows the level of investment in order 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  the *i*-th sector will face lack of capital utilization while if  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: ******. Note that if ** 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  then capitalist will overinvest in the *i*-th sector leading to excess of productive capacity.

As pointed out by Araujo and Teixeira (2003) the proportionality between the rate of profit to 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 the ******. 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 is – in the long run – 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 to establish a theory of natural prices in the 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 will prevail. Besides, when moving from a one sector to a multi-sectoral view 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 view, 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 PKGM in which actual rate of profit enters the sectoral investment equations enables us to take into fully consideration the patterns of consumption. Therefore the actual profit rates that enter 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 in its place.

In this vein, 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 profit of rate. 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 of rate does not provide the means too. Due to the failure of this concept to take into fully account the growth rate of demand, its level 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 vein, 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 that 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 context, by considering the concept of natural rate of profit, as advanced by Pasinetti as 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 that a more reliable concept to convey the roles of rate of profit in the investment equation is given by the following equation:

 (6).

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:

 (7).

 (8).

 (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. 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.

 (10).

 (11).

Note that if  then the numerator is positive and we face a wage led growth regime. If  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  it leads the sector to work in a wage led regime. Only the case in which the growth rate of demand is smaller than  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 n. The prevalence of wage led regime in small and closed economies is 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 Elder and Stockhammer (2008). It follows that here 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 PKGM 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 PKGM 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 PKGM, 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.

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2. This result will be used later in order to establish a value of the mark-up rate related to the natural rate of profit. [↑](#footnote-ref-2)