Accumulation Regimes, Endogenous Desired Rate of Capacity Utilization and Income Distribution

José Luís Oreiro

Abstract: The objective of this article is to analyse the effects of the introduction of the desired rate of capacity utilisation in the macroeconomic structure of Post Keynesian growth models over the relation between income distribution, effective degree of capacity utilisation and economic growth. In order to do so, we will suppose that desired rate of capacity utilisation is a decreasing function of the profit share. This change in the macroeconomic structure will produce a short run equilibrium configuration of the economy in which there is two equilibrium levels of productive capacity utilization and two equilibrium growth rates. In this situation, an increase in wage share can produce either an increase or a decrease in the effective level of capacity utilization, depending on the initial value of this variable. If capacity utilization is initially high, then an increase in the wage share will produce an increase in the effective degree of capacity utilization and the economy is in the “stagnationist regime”. However, if capacity utilization is initially low then an increase in the wage share will produce a reduction in the effective level of capacity utilization and the economy will be in the “exhilarationist regime”. For the long run equilibrium configuration of the economy, the endogenous treatment of planned degree of productive capacity utilization will produce a change in the causality relation between income distribution and economic growth. In our model, changes in the functional income distribution do not affect the growth rate of capital stock. In the long run, growth rate of capital stock is completely determined by the “animal spirits” of the capitalists, not being affected by changes in income distribution between wages and profits. But the reverse is not true: changes in the growth rate of capital stock will produce changes in income distribution between wages and profits. If the economy is in upward sloping region of the “no-entry-condition” curve then a reduction in the growth rate of capital stock will produce both a reduction in profit share and in the long-run level of capacity utilization. So a situation of “profit squeeze” can be the result of an autonomous reduction in capitalists’s propensity to invest, rather than the result of an increase in class struggle between capitalists and workers.

Key Words: Accumulation Regimes, Excess Capacity and Cooperative Capitalism.

JEL Code: B22

* Modified version of the paper delivered at 4th Annual Conference of the Association for Heterodox Economics, held at Dublin City University from 09 to 10 of july, 2002.
** Phd in Economics at Federal University of Rio de Janeiro and Professor of Economics at Universidade Federal do Paraná, Curitiba, Brazil [e-mail: joreiro@sociais.ufpr.br, webpage: www.joseluisoreiro.ecn.br]. Adress: Av. Pref. Lothario Meissner 3400, Têrreo, Jardim Botânico, Curitiba, Brazil. Zip Code: 80210-170.
1- Introduction

The principle of the effective demand in its Kaleckian version has been constantly invoked as the theoretical foundation of what was called in economic literature as "cooperative capitalism"; i.e. the idea that capitalists and workers could both benefit from a redistribution of income toward wages. The argument is that an increase in wage share would produce an increase in aggregate demand - since the propensity to consume out of wages is higher than the propensity to consume out of profits - and in the degree of capacity utilization. Thus, this change in income distribution would be compatible with the stability (or even though with an increase) of the profit rate. On the other hand, due to the existence of the accelerator effect, this increase in the degree of capacity utilization would induce firms to increase investment in fixed capital, stimulating growth. Therefore, according to this line of reasoning, the principle of the effective demand would be the theoretical foundation of the "cooperative capitalism" and also of wage-led growth regime.

However, some authors - for example, Marglin and Bhaduri (1990) - have questioned the hypothesis of wage-led growth at empirical and theoretical level. According to those authors, the empirical evidence of the European economies in 1960s and 1970s is incompatible with the hypothesis of a positive relation between wage share and degree of capacity utilization. In fact, as Figure 1 illustrates, a great reduction in profit share can be observed in the economies of United Kingdom, Germany, France and Italy during this period, and this reduction is also followed by a reduction in the degree of capacity utilization.

At theoretical level, the wage-led growth hypothesis does not take in account the effect of profit share on firm’s investment decisions. More specifically, a reduction of profit share may be a signal for entrepreneurs of a future reduction in the profit obtained by unit of product that firms will be able to sell with the additional productive capacity resulting of their investment decisions (cf. Marglin, S; Bhaduri, 1990, p. 173). In this case, entrepreneurs may decide to reduce their investment spending. This reduction of the investment – if strong enough - will produce a reduction in aggregate demand, in the degree of capacity utilization and in the growth rate of capital stock. In other words, an increase in wage share will result in a profit squeeze, which will produce a reduction in economic growth. According to this line of reasoning, the accumulation
regime will be a profit-led type, that is, economic growth is stimulated by an increase in profits, instead of "being pulled" by increase in wages.

Thus, the relation between income distribution, degree of capacity utilization and economic growth will be dependent on the macroeconomic structure; i.e. the set of structural relations between the main macroeconomic variables\(^1\). If investment is very sensitive to changes in the degree of capacity utilization, but little sensitive to changes in profit share; then the accumulation regime will be wage-led type. If, on the other hand, investment is very sensitive to changes in profit share and little sensitive to changes in the degree of capacity utilization; then the accumulation regime of will be profit-led type.

Table I

<table>
<thead>
<tr>
<th>Year</th>
<th>Profit Rate</th>
<th>Profit Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>1951</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>1952</td>
<td>12</td>
<td>22</td>
</tr>
<tr>
<td>1953</td>
<td>14</td>
<td>24</td>
</tr>
<tr>
<td>1954</td>
<td>16</td>
<td>26</td>
</tr>
</tbody>
</table>

Source: Marglin and Bhaduri (1990).

\(^1\) Marglin (1990) defines a macroeconomic structure as being the set of mechanisms that determine the global level of economic performance (p.6). This definition, however, is not very precise; because it does not specify the set of mechanisms that will determine the economic performance neither how economic performance is determined. In the present article, however, we will define the concept of macroeconomic structure as the set of relations between the main macroeconomic variables, and this set will be represented by structural equations between the variables in the model. For example, a macroeconomic structure can be represented by relations of the type \(I = f(u)\) or \(I = f(u, m)\), where I is the volume of investment, u is the degree of capacity utilization and m is profit share.
However, the Kaleckian view and the most recent approach of Marglin and Bhaduri had both disconsidered an important element of the macroeconomic structure: the relation between planned investment by the firms and planned (desired) degree of capacity utilization. In fact, these approaches consider investment as a function of the effective degree of capacity utilization (cf. Rowthorn, 1981; Dutt, 1984; Taylor, 1985) or consider the desired degree of capacity utilization as an exogenous variable of the model (cf. Amadeo, 1986) so that a change in profit share cannot produce a change in planned degree of capacity utilization.

Thus, the objective of the present article is to introduce the desired degree of capacity utilization as an *endogenous* variable in the macroeconomic structure of a post Keynesian growth model and evaluate the impact of this change on macroeconomic relations over income distribution, effective degree of capacity utilization and economic growth. In order to do that, we will assume - like Skott (1989) - that the planned degree of capacity utilization is a decreasing function of profit share. The economic basis of this assumption is the idea that excess capacity may be used by established firms as a device to increase the level of “barriers to entry” of new competitors in the industry. The desired level of excess capacity is an increasing function of the economic profits obtained by established firms; since the bigger is the economic profit, the greater will be the incentive for new firms to enter in the market.

This change in the macroeconomic structure will produce a short run equilibrium configuration of the economy in which there is two equilibrium levels of productive capacity utilization and two equilibrium growth rates. In order words, our model economy has multiple equilibrium. In this situation, an increase in wage share can produce either an increase or a decrease in the effective level of capacity utilization, depending on the initial value of capacity utilization. If capacity utilization is initially high, then an increase in wage share will produce an increase in the effective degree of capacity utilization and the economy is in the “stagnationist regime”. However, if capacity utilization is initially low then an increase in wage share will produce a reduction in the effective level of capacity utilization and the economy will be in the “exhilarationist regime”. So the relation between income distribution and capacity utilization is non-linear as Bhaduri and Marglin have suggested in their 1990 article.

However, for the long run equilibrium configuration of the economy, the endogenous treatment of planned degree of productive capacity utilization will produce a change in causality relation between income distribution and economic growth. In Marglin and Bhaduri model a
change in income distribution between wages and profits will produce a change in profitability of investment in fixed capital and, consequently, a change in the growth rate of capital stock. In our model, changes in the functional income distribution do not affect the growth rate of capital stock. In the long run, the growth rate of capital stock is completely determined by the autonomous component of the investment function – more precisely, the “animal spirits” of the capitalists - being independent of changes in income distribution between wages and profits. But the reverse is not true: changes in the growth rate of capital stock will produce changes in income distribution between wages and profits. If the economy is in the upward sloping region of the “no-entry-condition” curve then a reduction in the growth rate of capital stock will produce both a reduction in profit share and in the long-run level of capacity utilization. So a situation of “profit squeeze” can be the result of an autonomous reduction in capitalists’s propensity to invest, rather than the result of an increase in class struggle between capitalists and workers.

The present article is structured in five sections, including the present introduction. In the second section, we will present some theoretical arguments for the existence of a planned or desired level of excess capacity, for the relation between this variable and investment decision of the firms and the relation between income distribution, capacity utilization and capital accumulation in the canonical Kalecki-Steindl growth model. In third section, the basic structure of a Post-Keynesian growth model with endogenous planned degree of capacity utilization will be presented, as well as the short run equilibrium configuration of the economy. The fourth section presents the long run equilibrium configuration and analyses the effect of a reduction in capitalists’s animal spirits over income distribution and long run level of capacity utilization. The fifth section summarizes the conclusions.

2- Excess Capacity, Income distribution and Investment Decision: the Canonical Kalecki-Steindl growth model.

The growth models developed by Kaldor (1956, 1957) and Pasinetti (1961-62) assume that, in the long run, capitalist economies operate with full utilization of productive capacity. In
these models, income distribution was the adjustment variable between saving and investment decisions.

The problem with these kind of models is that they assume that \textit{mark-up} are completely flexible; i.e firms will react to any situation of excess demand or supply of goods through changes in profit margins (cf. Possas, 1987).

According to Kalecki, this type of behavior is a characteristic of the primary sector, where supply is price inelastic; that is, changes in demand will be entirely reflected in prices of these goods and, consequently, in profit margins (1956, p.7). The industrial sector, however, is characterized by the existence of an excess of productive capacity. In this context, changes in the demand for industrial products will be met only by changes in the level of production of these goods; prices and profit margins remaining constant.

For Kalecki, the "\textit{rigidity}" of the mark-up is a consequence - instead of being the cause - of the existence of excess productive capacity. Thus, the following question appears: what is the reason for the existence of idle capacity?

Kalecki does not formally answer to this question, because he does not make a clear distinction between planned and effective excess capacity. This question was formally addressed by authors related to industrial organization literature such as Steindl, Sylos-Labini and Spence.

According to Spence (1977), firms in oligopolistic markets desire to have excess capacity in order to serve as a barrier to the entrance of new competitors in the industry, since this idle capacity may be used as a \textit{"retaliation device"} against new competitors. More specifically, firms already established in the market can retaliate the entrance of new competitors through greater utilization of their productive capacity, which will result in a reduction in prices of goods produced by the firms of this sector and, therefore, in profits of the new competitors. These firms, in face of this threat, can consider more profitable to remain outside the market.

Other authors, like Steindl (1976), affirm that planned excess capacity arises because, first of all, firms want to be ready to met fluctuations in demand for their products, maintaining a certain level of excess capacity as way to increase or to keep constant their market-share in the case that demand is above of what was expected (cf. Steindl, 1976, p. 23). In the second place, excess capacity arises as as consequence of the indivisibilities of the capital stock which induce
firms to built productive capacity ahead of the growth of demand. This is what Steindl called
"The law of the accumulation of clientele".

Thus, we can define a "planned" level of productive capacity utilization, which is
certainly lower than maximum level, and that it is determined by structural factors like the level
of barriers to entry. This level of productive capacity utilization will serve as a reference point
for the investment decisions of the firms: if the effective level of capacity utilization is bigger
than the "desired" degree, than firms will invest with the objective to increase the productive
capacity and reduce the effective degree of capacity utilization to the “planned” level. Thus, we
can represent the investment decision by the following equation, where $u^d$ and $u^e$ represent
planned and effective degrees of capacity utilization, $g^l$ represents the growth rate of the capital
stock and $f$ represents animal spirits.

$$g^l = f + h(u^e - u^d); \quad (1)$$

In The General Theory (1936), Keynes defines animal spirits as the "spontaneous urge to
action rather inaction"(p.161). According to Carvalho (1992), the importance of animal spirits in
the investment decision is to determine the extension by which agents want to carry a irreversible
commitment of resources in a situation where their expectations about future market conditions
have little or none informational-basis (1992, p.122). In this case, the term $f$ in equation (1)
represents the autonomous part of the investment decision, that is, that share of investment
spending that is independent of the current level of capacity utilization.

In Equation (1), we are implicitly assuming that established firms have little or no
information regarding potential entrants in the "industry". For example, these firms can be
unaware of the cost structure of potential entrants and, therefore, about the level of excess
capacity below of which outside firms might decide to enter in the sector. Thus, animal spirits
represents the disposal of the established firms to face this uncertainty; i. e. disposal to invest

---

2 The importance of investment function specification in post Keynesian growth models should not be overlooked. For instance, in Bhaduri and Marglin 1990 model, investment is considered as a separable function of profit margin and capacity utilization, in the form of $I = I(z, h)$, where $z$ is the degree of capacity utilization and $h$ is the profit share. This particular specification of investment function is crucial for the existence of a profit-led accumulation regime in their model. In Rowthorn 1981 model, investment is taken as a function of profit rate and capacity utilization in the form of: $I = I(r, u)$, where $r$ is the profit rate and $u$ is the degree of capacity utilization. For this specification of investment function, the only possible accumulation regime is wage-led type. Alternative specifications of investment function in post Keynesian growth models should be seen in Lima (1998) and Ros (2003).
despite of uncertainty. Thus, greater is this disposal, higher will be the animal spirits, and also higher will be the capital stock growth rate.

The existence of excess capacity makes it impossible for profit share to be used as adjustment variable between saving and investment decisions. But, in this case, the income distribution between profits and wages becomes undetermined. In order to determine the share of income that will be appropriated by workers and capitalists, we must consider the determination of mark-up.

It can be shown that functional distribution of income will be determined after the determination of the mark-up. To show this, consider, that firms in the industrial sector of this economy determine the prices of their products on the basis of the following equation:

\[ p = (1 + \tau) w q \]  

(2)

Where: \( p \) is the level of prices in the industrial sector, \( w \) is nominal wage rate, \( \tau \) is the mark-up, \( q \) is the inverse of labour productivity.

The profit share (\( \pi = P/Y \)) is given by:

\[ \pi = \frac{P}{Y} = \frac{pX - wqX}{pX} = \frac{\tau wqX}{(1 + \tau) wqX} = \frac{\tau}{1 + \tau} \]  

(3)

It can be observed in equation (3) that profit share is an increasing function of mark-up, that is, if firms as a whole increase the rate charged upon unitary costs of production, there will be an increase in the share of aggregate income that is appropriated by capitalists.

But, in this case, what factors limit the ability of firms to fix a so high mark-up rate that make capitalists appropriate all income generated in this economy?

According to Kalecki, the market power – i.e – the capacity to raise prices over unit costs - of firms in the industrial sector is considerable, but it is not unlimited. The magnitude of mark-up is conditional to the monopoly power of firms established in the sector. This, in turn, depends on (i) the degree of market concentration in this sector; (ii) the degree in which “marketing” is
able to substitute price-competition as a device of sales promotion; and (iii) the degree of organization of unions. All these factors are **structural features** of a market economy and must be taken as given in an analysis that emphasizes only the determination of growth rate of capital stock.

Assuming that all income is shared between wages and profits, and that the propensity to save from out of profits is bigger than the propensity to save out of wages (and that this is equal to zero); it can easily be demonstrated that:

\[
g^s = \frac{S}{K} = s_p \pi u^e \sigma^{-1} \quad (4)
\]

Where: \( \sigma \) is the capital-output relation, \( g^s \) is the growth rate of capital stock permitted by available savings.

The equilibrium in the goods market occurs when \( g^i = g^s \). This equality, in turn, arises through changes in the degree of capacity utilization. If \( g^i > g^s \), then there will be an excess demand in the goods market, which will induce firms to increase the utilization of productive capacity. If \( g^i < g^s \) then there will be an excess of supply of goods, what will make firms to reduce the production level and, consequently, the degree of capacity utilization.

The determination of the degree of productive capacity utilization and the capital stock growth rate can be seen in the following figure:
In Figure 2 the equilibrium level of the effective degree of productive capacity utilization is lower than the “planned” or desired degree of capacity utilization.

A very interesting result of this Kalecki-Steindl model is that changes in the functional distribution of income have significant impact on the degree of capacity utilization as on the growth rate of capital stock. In particular, it can be shown that increase in wage share - induced by a reduction in mark-up - can produce an increase in the rate of capital accumulation and an increase in the degree capacity utilization.

Let us consider that, for whatever reason, an increase in wage share has occurred. Since propensity to save out of wages is lower than propensity to save out of profits, then there will be a reduction in aggregate saving (that is, curve $g^s$ will turn in the clockwise). For initial level of capacity utilization, there will be an excess of investment to saving, that is, an excess demand in the goods market. Firms will respond to this excess demand through an increase in the effective level of capacity utilization. This will increase the saving rate, reestablishing the equilibrium in the goods market.

But this is not the end of the story. The increase in the effective degree of capacity utilization will reduce the difference between the latter and the planned degree of capacity utilization. In order to keep the level of barriers to entry constant, established firms will increase investment and the growth rate of capital stock.

This reasoning shows that, in this economy, the accumulation of capital is wage-led type; i.e. is stimulated by increases in wage share. This occurs because an increase of the wage share will produce an increase in consumption, which will induce greater capital accumulation, due to the effect of the latter over the degree of capacity utilization.

On the other hand, it is not true that an increase in the real wage rate necessarily results in a reduction of profit rate. According to (2), we know that a reduction of mark-up will produce an increase of the level of real wage (w/p). We also know that profit share is an increasing function of mark-up; thus an increase of the real wage will produce a reduction of profit share.

However, the profit rate is the product between profit share, degree of capacity utilization and the inverse of capital-output relation. Although it is true that an increase in real wage rate produces a reduction in profit share; it is also true that, in accordance with previous analysis,
such increase in wage rates will produce a higher degree of capacity utilization. Thus, the relation between real wage and profit rate is *indefinite* in the growth model of Kalecki-Steindl type: it is equally possible to have an inverse relation between wages and profits or a direct relation between these variables. Everything will depend on the sensibility of the degree of capacity utilization to changes in mark-up rate. In other words, the idea that a “profit squeeze” can occur through the growth of wage-share is not true in the context of the Kalecki-Steindl growth model.  

3 - A Model with Endogenous Planned Degree of Capacity Utilization

3.1 The basic structure of the model

In the Kalecki-Steindl canonical model, presented in section 2, the planned degree of capacity utilization is an exogenous variable to the model. In this context, an increase in wage share would produce: (i) an increase of the effective degree of productive capacity utilization and (ii) an increase in the growth rate of capital stock.

However, it is perfectly possible to make endogenous the determination of planned degree of capacity utilization. In section 2 we saw that one reason for the existence of excess capacity is that established firms uses idle capacity as a way to prevent the entrance of new competitors in the industry. But, the excess capacity that is necessary to prevent the entrance of new firms will depend directly on the profit margin of established firms, since higher are profit margins, higher will be the incentive to the entrance of new competitors. Therefore, the excess capacity that is necessary to discourage the entrance of new firms has to be higher. In this case, the planned degree of capacity utilization is given by:

---

3 In the words of Marglin and Bhaduri: “(...) the keynesian objection to this view of profit squeeze is that a higher wage should increase aggregate demand, at least under the assumption that the propensity to save out of wages is less than the propensity to save out of profits. Although higher wages may diminish the profit per unit of output, business will make up this difference by an increased volume of production and sales. If investment demand increases with the rate of capacity utilization, there will be even greater aggregate demand, and both aggregate profits and the profit rate will be higher even as the profit share is lower” (1991, p.154).
\[ u^d = 1 - k \left[ 1 - \frac{ATC}{p} \right]; \quad k > 0 \quad (5) \]

Where: \( ATC \) is defined as average total costs.

We will assume, like Kalecki, that oligopolists firms determine the prices of their products based on a mark-up over direct costs of production. This mark-up depends on the "monopoly power" of the firm, which is determined by structural factors (level of the barriers of entry, product differentiation, etc); due to what we must take this rate as given in situations where no structural change has occurred. If aggregate demand will not be enough to guarantee the equality between planned and effective capacity utilization, then firms will reduce the degree of capacity utilization below of planned, keeping prices unchanged.

The production costs of established firms are given by the following equation:

\[ TC = wL + (i + \delta)pK \quad (6) \]

Where \( w \) is the nominal wage rate, \( L \) represents the quantity of labour employed; \( i \) is the nominal interest rate and \( \delta \) represents the depreciation of the stock of fixed capital.

Dividing the above equation by total production of the established firms, we get:

\[ ATC = wq + \left( \frac{(i + \delta)\sigma}{u^e} \right)p \quad (7) \]

Putting (7) in (5)\(^5\), we get:

\[ u^d = 1 - k \left[ \pi - \frac{(i + \delta)\sigma}{u^e} \right] \quad (8) \]

Since profit rate \( [r] \) can be defined as \( r = \frac{P}{Y} \frac{Y^k}{Y^K} \), where \( P/Y, Y/Y^k \) and \( Y^K/K \) represent, respectively, profit margin, effective degree of capacity utilization and capital-output relation; we can rewrite the rate of profit as:

\[ \text{In equation (5) we see that desired degree of capacity utilization in an inverse function of profit margin, which is defined as } \left[ \frac{p - ATC}{p} \right]. \]

\[ \text{From (7) we get: } \frac{ATC}{p} = \frac{w}{p} q + \frac{(i + \delta)\sigma}{p u^e}. \text{ But } (w/p)q \text{ is the wage-share which is given by } (1-\pi). \text{ Putting this expression in (5), we get equation (8).} \]

\[ \text{ }^4 \text{In equation (5) we see that desired degree of capicity utilization in an inverse function of profit margin, which is defined as } \left[ \frac{p - ATC}{p} \right]. \]

\[ \text{ }^5 \text{From (7) we get: } \frac{ATC}{p} = \frac{w}{p} q + \frac{(i + \delta)\sigma}{p u^e}. \text{ But } (w/p)q \text{ is the wage-share which is given by } (1-\pi). \text{ Putting this expression in (5), we get equation (8).} \]
\[ r = \frac{\pi \, u^e}{\sigma} \quad (9) \]

Putting (9) in (4), we get the following equation:
\[ g^* = s_p \, r \quad (4a) \]

Investment, saving and pricing decisions are given by equations (1), (2) and (4a). So equation (8) is the only real difference between our model and the canonical Kalecki-Steindl growth model.

### 3.2 – Short Run Equilibrium Solution of the Model

In the short run, firms operate with a degree of capacity utilization that can be different from the planned degree; in other words, there might be divergences between effective and planned degree of capacity utilization. We will assume, however, that in the short run firms are able to sell everything they produce so there is no involuntary accumulation of stocks, which in turn demands the equality between planned investment and planned saving:
\[ g^* = g^i \quad (10) \]

Therefore, the model can be summarized by the following system of equations:
\[ u^d = 1 - k \left[ \pi - \frac{(i + \delta) \sigma}{u^e} \right] \quad (8) \]
\[ r = \frac{\pi u^e}{\sigma} \quad (9) \]
\[ g^i = f + h(u^e - u^d) \quad (1) \]
\[ g^r = s_p \, r \quad (4) \]
\[ g^* = g^i \quad (10) \]

The endogenous variables of the system are: \( g^i \), \( g^r \), \( r \), \( u^d \) and \( u^e \). There are five variables to be determined by five linear independent equations. In this case, the above system of equations has, at least, one solution.

In order to solve the model for the short run equilibrium configuration, let us first substitute equation (8) in (1) in order to get the following expression:
\[ g^i = f + h \left[ \frac{u_e^2 - (1 - k \pi q)u_e - (i + \delta)\sigma}{u_e} \right] \] (11)

Equation (11) presents the growth rate of capital stock as a function of effective degree of capacity utilization. Taking the first derivative of this expression relative to \( u_e \) and \( g^i \), we get:

\[ \frac{\partial g_i}{\partial u_e} = \left[ h + \frac{h(i + \delta)\sigma}{u_e^2} \right] > 0 \] (11a)

So an increase in the effective level of capacity utilization will produce an increase in investment and in the growth rate of capital stock. This is the so-called “accelerator effect” of changes in production levels of the firms over their investment decisions. However, it must be observed that each increase in capacity utilization will produce a smaller increase in the capital stock growth rate. In this context, the relation between capacity utilization and the growth rate of capital stock can be shown by the following figure:

Substituting (11) and (4) in (10), we get:

\[ u_e^2 + \frac{f - h(1 - k \pi q)}{h - s_p \pi \sigma^{-1}} u_e - \frac{h(i + \delta)\sigma}{h - s_p \pi \sigma^{-1}} = 0 \] (12)

This equation will have two real roots if the following condition is satisfied:

\[ [f - h(1 - k \pi q)]^2 - 4h(i + \delta)\sigma(h - s_p \pi \sigma^{-1}) > 0 \] (12a)

These roots will be of positive sign if these conditions are met:
Equation (12b) is the traditional stability assumption of Keynesian growth models that is supported in the idea that propensity to save is bigger than propensity to invest. We must observe that if conditions (12b) and (12c) are imposed to the model then condition (12a) will be always satisfied. In this case, equation (12) will have two distinct real positive roots. This means that our economy has two equilibrium levels for the degree of capacity utilization, as we can see in Figure 4.

\[ h < s \rho \pi \sigma^{-1} \]  
\[ f > h(1 - k \pi q) \]

It can be easily shown that the equilibrium with a high capacity utilization is stable and the equilibrium with a low capacity utilization is unstable.

In the short run, the equilibrium configuration of this economy, the profit-share is an exogenous variable determined by the rate of mark-up. Since the structure of the industry – determined by the number of established firms – is given, the degree of monopoly is constant, which means that their ability to fix prices above unitary costs is also given. In this context, we can do some comparative static experiments with profit share. In other words, we can analyse the effect of an exogenous change in the profit share – due to a change in mark-up rate – over the (high-) equilibrium level of capacity utilization.
An increase in profit share will produce an increase in the equilibrium level of capacity utilization if \( \frac{\partial g^i}{\partial \pi} > \frac{\partial g^z}{\partial \pi} \). This condition will be met if \( u_e < \frac{\sigma h k q}{s_p} \). However if \( u_e > \frac{\sigma h k q}{s_p} \) then an increase in profit share will produce a reduction in the equilibrium level of capacity utilization. So an increase in profit share can result either in an increase or a decrease in the degree of capacity utilization, depending on the initial value of this variable. Consequently, the relation between the profit margin and effective degree of capacity utilization is no-linear, given by an inverted “C” curve represented by figure 5.

\[
\text{Exhilaracionist Regime} \\
\text{Stagnacionist Regime} \\
\]

\[
\underline{u} = \sigma h k q s_p^{-1} \\
\underline{\pi} \\
\]

Figure 5

In figure 5 we can observe the existence of two macroeconomic regimes: a “stagnacionist regime” in which an increase in profit share produce a reduction in the effective level of capacity utilization and a “exhilaracionist regime” in which an increase in profit share will result in an increase of capacity utilization.

The relation between effective and desired degree of capacity utilization is given by equation (8). Evaluating the impact of a change in \( u^d \) and \( u^e \) we will get:
\[
\frac{\partial u_d}{\partial u_e} = -\frac{k(1 + \delta)\sigma}{u_e^2} < 0 \quad (13)
\]

Equation (13) shows the existence of an inverse relation between effective and planned degree of capacity utilization. An increase in effective degree of capacity utilization will produce a reduction in average production costs of established firms, which will in turn increase their economic profits given the rate of mark-up. In order to deter the entry of new competitors, established firms have to increase their excess capacity, so there will be a reduction in planned degree of capacity utilization. The relation between these two variables is shown in figure 6:

![Figure 6](image)

It must be observed that in the short run equilibrium configuration of this economy, the equilibrium level of effective degree of capacity utilization can be greater or lower than the desired degree of capacity utilization. In the short run, this situation will not produce the entrance of new firms in the industry, so that mark-up can remain constant. In this case, the equilibrium level of capacity utilization will be determined by equation (12); and once this variable is determined, the planned degree of capacity utilization will be determined by equation (8). It is quite obvious that, except for a “happy coincidence”, the effective and planned levels of capacity utilization will be different.
4 - The Long Run Equilibrium Solution of the Model

In the long run the "degree of monopoly" is endogenous. If established firms persistently operate with a degree of capacity utilization higher than the planned degree; then entry of new competitors will occur, which will reduce the "degree of monopoly" of the established firms and also reduce the profit share. This means that the profit share will change according to the following differential equation:

\[ \dot{\pi} = \theta(u_d - u_e) \quad ; \theta > 0 \quad (14) \]

Substituting (8) in (14) we get:

\[ \dot{\pi} = \theta \left[ 1 - k \left( \pi - \frac{(i + \delta)\sigma}{u_e} \right) - u_e \right] \quad (15) \]

Income distribution between wages and profits will be constant through time if and only if desired and planned levels of capacity utilization are equal, that is, if the following condition is met:

\[ u = 1 - k \left( \pi - \frac{(i + \delta)\sigma}{u} \right) \quad (16) \]

Equation (16) is the “no-entry-condition”, ie. the condition that must be met in order to avoid the entry of new competitors in the industry. Taking the first derivative of this equation in relation to \( u \) and \( \pi \), we get:

\[ \frac{\partial u}{\partial \pi} = -\frac{kqu^2}{u^2 - (i + \delta)\sigma k} \quad (16a) \]
The numerator of (16a) is always positive, so the sign of this expression depends entirely on the sign of the denominator. If \( u^2 - (i + \delta)\sigma k > 0 \), then \( \frac{\partial u}{\partial \pi} < 0 \). But, if \( u^2 - (i + \delta)\sigma k < 0 \), than \( \frac{\partial u}{\partial \pi} > 0 \). This means that a critical value of \( u \) exists – equal to \( [(i + \delta)\sigma k]^{1/2} \) - above which \( u \) and \( \pi \) are negatively related and below which these variables are positively related. This can be shown by “no-entry-condition” curve (NEC) in figure 7.

The effective degree of capacity utilization will be changing through time according to the following differential equation:

\[
\dot{u} = \lambda (g^l - g^+) \quad ; \quad \lambda > 0 \quad (17)
\]

Substituting (4) and (11) in (17) we get:

\[
\dot{u} = \lambda \left[ \left( h - \frac{s_p \pi}{\sigma} \right) u^2 + \left[ f - h(1 - k\pi q) \right] u - h(i + \delta)\sigma \right] \quad (18)
\]

Figure 7
In *steady-state*, the effective degree of capacity utilization will be constant, so that $g^i = g^s$. This equality will hold if equation (12) is satisfied. In this case the relation between $u$ and $\pi$ for which the goods market is in equilibrium is given by figure 5.

The long-run equilibrium configuration of this economy is such that: $\dot{u} = \dot{\pi} = 0$. This will occur in the point of intersection between the “no-entry-condition” curve (NCE) and the “market-clearing-condition” curve (MCC). Since both curves are *backward-bending*, there are several possible equilibrium configurations as we can see in figures 8 (a), 8(b) and 8(c):
In order to analyze the stability of the long-run equilibrium position of this economy we will assume – following Dutt (1984) – that at each point in time the economy is in goods market equilibrium so that it must always be on MCC curve. In this case the dynamics of the system is entirely determined by equation (15). According to this equation, all points located to the left of the NCE curve are such that the monopoly power of established firms and profit share are decreasing because new firms are entering into the industry; and all points located to the right of this curve are such that monopoly power of established firms and profit share are increasing. Given this dynamics for the profit share, it can be easily shown that the equilibrium configurations of figures 8(a) and 8(c) are stable, but the equilibrium configuration represented by figure 8(b) is unstable.

Since in the long run equilibrium configuration for this economy, the effective degree of capacity utilization is equal to planned or desired degree of capacity utilization, then growth rate of capital stock will be given by \( g' = f \). In other words, investment is completely determined by capitalists’ animal spirits, being independent of changes in capacity utilization or changes in income distribution between wages and profits. This means that there is no such a thing as a wage-led or a profit-led growth in the long run.

However, changes in capitalists’ animal spirits can change long run equilibrium values of capacity utilization and profit share. In fact, let us consider that – for whatever reason – there had been a reduction in animal spirits. In this case, the MCC curve will be shifted down in figures 8(a) and 8(c) which will result in new equilibrium configurations represented in figures 9(a) and 9(b).
In Figure 9(a), the initial equilibrium position is in the upward sloping region of NCE curve. In this case, a reduction in animal spirits will produce a reduction in capacity utilization and in the profit share. Since the rate of profit is the product between the profit share and capacity utilization, a situation of profit squeeze will occur as a result of a reduction in the rate of capital accumulation. Although this result looks similar to the “profit squeeze” story of Marglin and Bhaduri, the causality relation between growth and distribution is reversed. In Marglin and Bhaduri model an increase in the profit share may reduce investment, which will reduce the rate of economic growth; but, in our model, an exogenous reduction in the rate of economic growth will produce both a reduction in profit margin and capacity utilization.

In figure 9(b), however, a reduction in capitalists’s animal spirits will produce a reduction in capacity utilization but an increase in the profit share. This result looks similar to the “stagnation” story in which an increase in mark-up rate, due to an increase in monopoly power of established firms, will produce a reduction in the wage share and a reduction in the effective degree of capacity utilization, due to a reduction in consumption expenditure. But is important to
note that the increase in the profit share and the reduction in capacity utilization are, in our model, both the result of an exogenous reduction of the rate of economic growth\textsuperscript{6}.

5 – Conclusion

In this article, we argued that the impact of an increase in the wage share over capacity utilization and the growth rate of capital stock depends on the way in which planned degree of productive capacity utilization is represented in Post-Keynesian growth models. If planned degree of productive capacity utilization is \textit{exogenous}, then an increase in wage share will result in a reduction of the excess capacity and an increase in capital stock growth rate.

On the other hand, if planned degree of capacity utilization is \textit{endogenous}, then an increase in wage share can produce either an increase or a reduction in capacity utilization in short run, depending on the effect that changes in income distribution have on planned excess capacity. In long run, however, capital stock growth rate is independent of distribution of income between wages and profits, so \textit{accumulation regimes} do not exist in long run. In the long run, the capital stock growth rate depends only of capitalists’s \textit{animal spirits}.

However, changes in the rate of capital accumulation will produce changes in income distribution and capacity utilization. If the initial long-run equilibrium position of the economy is in the upward region of “no-entry-condition” curve than a reduction in growth rate of capital stock will produce both a reduction in profit share and capacity utilization. This result is similar to the “profit squeeze” story of Marglin and Bhaduri but have a completely different causality relation between growth and distribution. Instead of changes in income distribution cause changes in the rate of economic growth, the reverse is true: changes in economic growth produce – through changes in monopoly power of established firms – changes in income distribution. If the initial long-run equilibrium position of the economy is in the downward sloping region of the “no-entry-condition” curve then a reduction in the rate of capital accumulation will produce an

\textsuperscript{6} A reader may ask what would happen if, instead of a reduction, occurs an increase in animal spirits. In both cases – figures 9(a) and 9(b) – that will be an increase in long-run capacity utilization. However, this increase will not produce desestabilizing effects over the long-run equilibrium position as in Harrod’s growth model. In fact, the long-run equilibrium positions described by figures (8a) and 8(c) are \textit{stable}, as we have already seen. The stability of these equilibrium positions makes impossible the occurrence of a process of cumulative divergence between warranted and effective rates of growth, as occurs in Harrod (1939).
increase in profit share but a reduction in the level of capacity utilization. This results looks like the “stagnation” story but with an inverse causality relation between growth and distribution.

As corollary of these conclusions, we get that a situation of “profit squeeze” is not the result of an increase in the power of labour unions which will produce increases in real wages ahead of productivity growth; but can be the result of a reduction in capitalists’s animal spirits which reduce the rate of economic growth. So we can conclude that a reduction in profitability is the result rather than the cause of a stagnant growth.

REFERENCES

AMADEO, E.J. (1987). Expectativas, Demanda Efetiva e Centros de Gravitação in 
Universidade Federal do Ceará.


CARVALHO, F.C. (1992). Mr. Keynes and the Post Keynesians: principles of
macroeconomics for a monetary production economy. Edward Elgar: Aldershot.

Journal of Economics, 8.

University Press: Cambridge.


-------------- (1958) Capital Accumulation and Economic Growth in Further Essays on


