A Class Approach to Kaleckian Growth and Distribution Models: estimations for the USA economy

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Abstract

The presence of overhead labor has important theoretical implications for the Kaleckian growth and distribution models, such as a pro-cyclical profit share and different consumption behaviors between direct and overhead labor, as the latter is associated with managers who earn higher average wages than workers. These effects must have been particularly important in the USA economy as managers largely increased their share in income in the past decades. We analyze whether there is a difference between the impact of each of these classes on capacity utilization rates in the USA economy by estimating a VECM with capacity utilization and each type of wage share from 1967 to 2010. Our contribution is to better capture income distribution by following a class approach, as well as to estimate the so-called aggregative model with capacity utilization measured by the Federal Reserve, which allows the model to capture a level relation between the variables. In this case, the profit-led short-run outcome does not hold in the longer run. Also, the managers' share determines this short-run result and the workers' share has a long-run positive impact on capacity utilization which is larger than the one of the former. However, the Granger-causality tests do not support these directions of causality, suggesting that each income share has a neutral impact on capacity utilization and, thus, there is no trade-off between improving equality (higher workers' share) and higher levels of economic activity. The distribution schedule suggests that capacity utilization determines functional income distribution and that labor strength also plays a role.

Keywords: Economic Growth, Functional Income Distribution, Wage Distribution, Kaleckian Models.

Resumo

O fato de que parte dos empregados representa um custo fixo traz importantes implicações teóricas aos modelos Kaleckianos de crescimento com distribuição de renda, como a pró-ciclicidade da parcela dos lucros na renda e diferentes padrões de consumo entre as duas categorias de empregados, dado que estes representam gerentes que recebem salários médios mais elevados do que os trabalhadores. Os gerentes aumentaram fortemente sua parcela na renda nos Estados Unidos nas últimas décadas, sugerindo que essas implicações são particularmente fortes nesta economia. Para analisarmos se há uma diferença entre o estímulo de cada uma dessas classes às taxas de utilização da capacidade dos Estados Unidos, um VECM incluindo a taxa de utilização e dividindo a parcela dos salários na renda entre essas duas classes é estimado para o período de 1967 a 2010. A contribuição deste estudo é de captar com maior precisão a distribuição de renda ao seguir uma abordagem baseada em classes, além de estimar o modelo com a utilização de capacidade medida pelo Federal Reserve, o que permite capturar uma relação de nível entre as variáveis. Neste caso, o resultado de um regime liderado pelos lucros no curto prazo não se mantém no longo prazo. Além disso, a parcela dos gerentes na renda é que determina este resultado de curto prazo e a parcela dos trabalhadores na renda tem um efeito positivo mais elevado do que a parcela dos gerentes. Entretanto, os testes de causalidade de Granger não suportam estas direções de causalidade, sugerindo que cada parcela na renda tem um impacto neutro na taxa de utilização e, assim, que não há um conflito entre melhorar a distribuição de renda (mais elevada parcela dos trabalhadores) e mais elevados níveis de atividade econômica. O modelo também mostra que a taxa de utilização e a força dos trabalhadores impactam a distribuição funcional de renda.

Palavras-chave: Crescimento Econômico, Distribuição Funcional da Renda, Distribuição dos Salários, Modelos Kaleckianos.

JEL classification: E12, E25, E6.

Área de interesse de submissão: Área 2 - Distribuição de renda e crescimento econômico.

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1 Introduction

The stagnationist literature was inaugurated by Baran and Sweezy (1966) and Steindl (1976, 1979), who were analyzing what seem to be, at their time, a tendency of stagnation in rich countries in the future related to an inelastic profit function which prevented an increase of the wage share that would stimulate demand. The following literature that builds on the work of these first authors is known as Kaleckian growth and distribution models (Bhaduri and Marglin, 1990, Blecker, 1989, Dutt, 1984, Rowthorn, 1981, Taylor, 1985). Different from the former authors, this second group of authors did not focus on the possibility of a tendency of secular stagnation in capitalist economies but rather on mathematical models that could represent the relation between functional income distribution and growth (Rugitsky, 2016). According to Blecker (2016), the basic logic of these models is that a redistribution of income towards wages will boost consumption, diminish the competitiveness of national products, and lessen profits (which are an incentive for private investment). The sum of these effects will determine whether aggregate demand will grow or diminish in reaction to a shift of income distribution toward wages; thus, if aggregate demand is wage- or profit-led respectively. As the theoretical models admit both outcomes, this relation must be tested empirically.

In this sense, several authors have analyzed many countries in order to identify their regime. There is not, however, a convergence between the results found by different studies on the same country, as discussed by Blecker (2016) and Lavoie and Stockhammer (2012). For the case of the United States, for instance, some studies conclude that it is wage-led, whereas others conclude that it is profit-led.

Recent attempts to have more realistic empirical models include financialization (Onaran et al., 2011) and personal income distribution (Carvalho and Rezai, 2015) for instance. There is, however, one mechanism that has not been explored much by the empirical literature and that is related to the wage distribution between the working-class and the non-working-class[1].

Theoretical models have seldom divided wage earners into two different classes. Still, there are two important consequences of splitting wage earners into the working and non-working classes. Firstly, the profit share becomes a function of the level of capacity utilization and can be considered endogenous to the business cycle (Lavoie, 2014). Secondly, a wage income distribution towards the working-class and away from the non-working-class might lead to higher levels of consumption due to the different propensities to save between these two classes. Therefore, even if capacity utilization is found to be profit-led, this does not mean that an income redistribution towards the working class will necessarily hurt aggregate demand (Palley, 2015, 2017*b*).

These implications might be particularly important for the case of the USA, which has experienced a strong income redistribution towards profits and towards the managerial class in the last decades (Mohun, 2006, 2014, 2016). This is also one of the distributional aspects of financialization, along with the increase in the profit share. Hein (2014) argues that the reduced bargaining power of unions and the rise of powerful rentiers and of the financial sector determined these outcomes. In a panel data study, Stockhammer (2017*a*) shows that financialization was the main determinant of the decrease in the wage share from 1970 to 2007.

In a historical perspective, the rise of finance and political decisions since the Reagan era changed the terms of the class struggle (Mohun, 2006) and led to the process of concentration of income in the USA. On the one hand, the association of managers' concerns with those of capitalists through the ideology of share holder maximization has mobilized them to control workers' compensation shares (Guttmann, 2016). On the

[1] In the present text, the terms production labor, direct labor, and variable labor are also used to refer to the working-class, while the terms managers, supervisory labor, overhead labor, and fixed labor also refer to the non-working-class. There is also a correspondence between salary earners and overhead labor, although wages is used as a broader definition to encompass the income of the working class (who earns hourly wages) and of the non-working class.

other hand, managers have succeeded to increase their share in the surplus value because of their position as supervisors (Mohun, 2006). This increase in managers' income has taken place not only through higher salaries to top executives but also through the adoption of executive stock options (Lazonick and O'Sullivan, 2000). Duménil and Lévy (2015, p. 72) also analyze this process in terms of what they name "managerial capitalism", which leads them to interpret neoliberalism *"as the expression of an alliance between capitalist and managerial classes* (...) *along a path in which the interest of upper classes would be jointly protected from the threat of popular struggle"*. The authors argue that an important characteristic of the period is the fact that high wages became the main channel of concentration of income (that benefited upper classes).

Thus, especially since the 1980s, the USA economy has experienced an increase in the inequality among wage earners. As most of the empirical literature on the topic has focused on functional income distribution and largely ignored within-wage inequality, the novelty of the present study is to empirically explore the implications of the distribution of the wage income between the working-class and the non-working-class by estimating a capacity utilization function for the USA economy from 1967 to 2010. This model follows a systems approach by which a distributional scheduled is also estimated, allowing us to capture the effect of overhead labor on the distribution of income. Our study can be considered part of the more recent effort to better capture income inequality (more specifically, inequality within wage earners from a class perspective) and one of the implications of financialization.

Besides this introduction, this paper has four other sections. Section 2 presents the literature review, section 3 presents the aim of our study, section 4 explores the empirical model. Finally, the last section presents our concluding remarks.

2 Literature Review

A key aspect of Kaleckian models is the acceptance of paradoxes that conflict with the neoclassical theory, as a result of their holistic approach over the atomistic approach adopted by the latter. These paradoxes can be understood as emergent properties that show that *"what seems reasonable for a single individual or nation leads to unintended consequences or even to irrational collective behaviour when all individuals act in a similar way"*, contradicting the pure aggregation of representative agents (Lavoie, 2014, p. 17).

In particular, there are two paradoxes that are explored by Kaleckian models of growth and distribution. Firstly, the paradox of thrift brings to light the fact that a lower propensity to save leads to a higher rate of accumulation and level of output. This paradox was first explored by Keynes (1936) and is one of the basis of his principle of effective demand. Since a standard hypothesis is that workers have a lower propensity to save than that of capitalists, a shift in income distribution towards wages would, according to the paradox of thrift, lead to higher growth.

Secondly, as explored by Kalecki and described in a dynamic version by Rowthorn (1981), the paradox of costs[2] shows that a rise in real wages (lower costing margins) leads to a higher profit rate at the macroeconomic level. Although wages are seen as a cost and individual firms may ask for reductions of labor costs in an effort to improve their profitability, they are also a source of demand. A reduction of wages can cause a reduction of aggregate consumption, sales, capacity utilization, and investment expenditures, driving profit rates down. In the words of Marglin and Bhaduri (1990, p. 183), *"high wages are bad for the capitalist as* producer *but good for the capitalist as* seller".

[2]The paradox of costs is only valid as long as there is not full capacity utilization; otherwise, higher wages will induce higher prices rather than higher activity (Lavoie, 2014, Marglin and Bhaduri, 1990).

In the Kaleckian models, effective demand is a key aspect and defines how the economy will operate, even in the long run. Blecker (2002) summarizes important assumptions of these models that follow Kalecki's contribution. Firstly, it is assumed that workers have a higher marginal propensity to consume than capitalists. Secondly, the investment function includes retained profits, as internal funds can diminish the financial constraints on investment (the "increasing risk" principle). Thirdly, Kalecki considers a model with oligopolistic mark-up pricing in manufacturing industries. Finally, the models are constructed considering excess capacity, so that aggregate demand is key to determining the equilibrium levels of realized profits and national income.

In these models, aggregate demand can be wage-led or profit-led depending on whether the effect of an increase in the profit share on capacity utilization is negative or positive respectively. Moreover, if the reaction of the profit rate to shifts in the profit share is negative, it is a cooperative regime; otherwise, it is a conflictual regime (in Marglin and Bhaduri's (1990) definition). From these two definitions, it is possible to determine whether the accumulation regime is wage-led or profit-led. Wage-led growth is a regime in which a higher wage share is associated with a higher rate of accumulation; otherwise, growth will be profit-led.

In the next section we present a short overview of the Kaleckian growth and distribution models. As our objective is to understand the theoretical implications of considering overhead labor and these can be well explored in a closed-economy model, we content ourselves with this model. In the following sections we explore the models that include overhead labor and a three class model with more detail.

2.1 The Kaleckian Growth and Distribution Model

In the simple models[3], the economy has only one sector and it is closed, with no government, and without workers' savings. Following Kalecki (1971), the price equation considers a mark-up over prime costs[4], as shown in equation 1:

$$p = (1+m)\bar{W}y^{-1} \tag{1}$$

where, p is price, $m > 0$ is the mark-up, $\bar{W}$ is the money wage rate, and y is the output-labor coefficient. Therefore, $\bar{W}y^{-1}$ is the unit labor cost. All these variables are considered exogenous.

Based on equation 1, the profit share (π) and the profit rate (r) are given by equations 2 and 3 respectively:

$$\pi = \frac{P}{Y} = \frac{p - \bar{W}y^{-1}}{p} = \frac{m}{1+m} \tag{2}$$

$$r = \frac{P}{K} = \frac{P}{Y}\frac{Y}{Y^*}\frac{Y^*}{K} = \frac{\pi u}{v} \tag{3}$$

where P is the aggregate profits, Y is the real output, K is the capital stock (considered constant), Y^* is full capacity output, $u = Y/Y^*$ is the capacity utilization rate, and $v = Y^*/K$ is the full capacity output-capital ratio.

The rate of accumulation (g^s) is the aggregate saving in relation to the capital stock, as expressed by equation 4, and represents the rate of accumulation allowed by realized saving (Blecker, 2002):

$$g^s = \frac{S}{K} = s_p r = s_p \pi u v^{-1} \tag{4}$$

[3] This model is based on Bhaduri and Marglin's (1990), Blecker's (2002), and Lavoie's (2014) summaries of the early Kaleckian models.

[4] According to the author, the mark-up reflects the degree of monopoly of the firm (in perfect competition, it would be zero). Asimakopulos (1975) argues that it can be understood as something that allows and protects firms' higher profitability.

where $s_p > 0$ is the propensity to save out of profit (so workers do not save).

Dutt (1984) and Taylor (1985) consider the rate of investment (g^i) as a function of the rate of profits and utilization rate, as shown in equation 5, in which depreciation is ignored for simplicity:

$$g^i = \frac{I}{K} = f_0 + f_1 r + f_2 u \tag{5}$$

where all coefficients are positive. The intercept, f_0, represents the Keynesian animal spirits. The profit rate is included due to the belief that a higher expected profit rate will induce investment (expected and current profit rates are assumed to be equal). The last term included is the capacity utilization, emulating an "accelerator effect".

The goods market equilibrium ($g^s = g^i$) is expressed by a Kaleckian IS-curve, which gives the equilibrium between investment and saving. Substituting the profit rate in equation 5 by equation 3 and solving for u provides the equilibrium capacity utilization rate:

$$u = \frac{f_0}{(s_p - f_1)\pi v^{-1} - f_2} \tag{6}$$

The stability condition for the goods market implies that the denominator must be positive, i.e., the induced increase in investment as the capacity utilization rises must be smaller than the induced increase in saving ($(s_p - f_1)\pi > v f_2$). The differentiation of equation 6 with respect to the profit share is given by equation 7. Given the stability condition and the fact that $f_2 > 0$, we have that $(s_p - f_1) > 0$, so this differentiation is negative and it is a wage-led aggregate demand regime.

$$\frac{\partial u}{\partial \pi} = \frac{-(s_p - f_1) f_0 v}{[(s_p - f_1)\pi v^{-1} - f_2]^2} < 0 \tag{7}$$

From equations 3 and 6, the profit rate as a function of the profit share is given by equation 8 and its differentiation is given by equation 9. Considering that f_0 and f_2 are assumed to be greater than zero, the differentiation expressed by equation 9 must be negative, i.e., there is a negative relation between the rate of profit and the profit share and, thus, the regime is cooperative and the paradox of costs holds.

$$r = \frac{\pi f_0 v^{-1}}{(s_p - f_1)\pi v^{-1} - f_2} \tag{8}$$

$$\frac{\partial r}{\partial \pi} = \frac{-f_0 f_2 v^{-1}}{[(s_p - f_1)\pi v^{-1} - f_2]^2} < 0 \tag{9}$$

Given equations 4 and 6, the accumulation rate as a function of the profit share is given by equation 10 and its differentiation is given by equation 11. Because f_0, f_2 and s_p are greater than zero, the differentiation of the rate of accumulation with respect to the the profit share must be negative, therefore, it is a wage-led accumulation regime.

$$g = \frac{s_p \pi f_0 v^{-1}}{(s_p - f_1)\pi v^{-1} - f_2} \tag{10}$$

$$\frac{\partial g}{\partial \pi} = \frac{-s_p f_0 f_2 v^{-1}}{[(s_p - f_1)\pi v^{-1} - f_2]^2} < 0 \tag{11}$$

A modification to this model can be introduced by allowing for positive savings out of wages, which was examined by Taylor (1990) and Blecker (2002), among others. This assumption implies a different saving rate equation from the one in equation 4, as shown in equation 12:

$$g^s = [s_p \pi + s_w(1-\pi)]uv^{-1} = [(s_p - s_w)\pi + s_w]uv^{-1} \tag{12}$$

where s_w is the propensity to save out of wages, which is assumed to be smaller than s_p.

When the model is closed with this equation, different outcomes are possible. Capacity utilization may be profit-led if the propensity to save out of profits is not sufficiently higher than the propensity to save out of wages. The growth rate can also become profit-led is this model and the paradox of costs might not hold (the paradox of thrift still holds). Therefore, the sign of the derivative of these variables with respect to the profit share is not given *a priori*, as the stimulating effects of a redistribution of income towards wages through higher consumption are reduced. Yet, based on data from several studies that estimate the relevant parameters, Mott and Slattery (1994) argue that the conditions for wage-led domestic demand are likely to be fulfilled.

A second modification to this model is to consider a different investment function, as the previous one is considered unsatisfactory by authors such as Bhaduri and Marglin (1990) and Marglin and Bhaduri (1990). They argue that introducing the capacity utilization and the profit rate in equation 5 is not a correct procedure, as it imposes unwarranted restrictions to the relative response of investment to the profit share and the capacity utilization. Their argument can be understood by decomposing the profit rate as a product of the profit share and the utilization rate as in equation 3. Substituting equation 3 in equation 5 renders equation 13, in which it is clear that the capacity utilization is counted twice.

$$g^i = \frac{I}{K} = f_0 + f_1 u \pi v^{-1} + f_2 u \tag{13}$$

As explained by Blecker (2002), the condition that $f_2 > 0$ implies that if u rises and π falls by the same percentage at the same time, firms will necessarily want to invest more; not a very sensible result. Consequently, the possibility of a profit-led regime is ruled out by this model. To Marglin and Bhaduri (1990), the sign of f_2 is undetermined and the assumption of $f_2 > 0$ requires a belief in very strong capacity utilization effects.

The solution proposed by Bhaduri and Marglin (1990) is to treat the profit share and capacity utilization as independent and separate arguments. A linearized version of their equation can be expressed by equation 14:

$$g^i = g_0 + g_1 \pi + g_2 u \tag{14}$$

where g_1 and g_2 are positive (g_0 can be either positive or negative (Lavoie, 2014)). This is now referred to as the post-Kaleckian model (Hein, 2014, Lavoie, 2014). Closing the model with this equation and still assuming that workers do not save allows for a profit-led result even in a closed economy, as the sign of the derivatives of capacity utilization and the accumulation rate with respect to the profit share are unknown. Once again, it is possible that the paradox of costs no longer applies.

However, this investment equation is not unanimously accepted in the literature. For instance, despite the arguments against equation 5, Mott and Slattery (1994) do not agree with the solution expressed in equation 14 and believe that the previous equation was more adequate. The authors question why investors would care about the profit share or the mark-up in itself when considering investment spending. Moreover, the authors point out that changes in the profit rate and utilization rate can have independent effects if one considers that profits (retained earnings) affect the ability to finance investment. Lavoie (2014) also argues that π is a bad indicator of profitability when there is overhead labor (see section 2.2.3).

2.2 Overhead Labor

Despite the fact that one of the very first neo-Kaleckian models (Rowthorn, 1981) includes overhead labor, the following theoretical models have largely ignored this. A few exceptions are Dutt (2012), Lavoie (1992, 1996, 2009, 2014), and Nichols and Norton (1991). The next sections respectively discuss the implications of considering overhead labor on income distribution, productivity, and aggregate demand.

2.2.1 Income Distribution

The distinction between overhead and direct labor is essentially that the former is proportional to production capacity while the latter is proportional to actual output. Kalecki (1990) observed already in 1956 that the share of wages in income is fairly stable during the business cycle, while the share of salaries seems to vary counter-cyclically[5]. Asimakopulos (1975) draws a theory of income distribution inspired by Kalecki's work and in which overhead labor is an important explanation, as income shares become determined by the mark-up and by aggregate demand, so there is a rise of the profit share as output expands. This is shown in a simple matter by Lavoie (2014), who argues that the profit share will vary pro-cyclically because total unit costs will decrease as overhead costs do not increase with production.

Empirical evidence provided by Weisskopf (1979) shows strong support to this rationale. The author decomposes the profit rate into three components: the share of profits, the rate of capacity utilization, and full capacity output to capital ratio, as in equation 3 (reproduced below).

$$r = \frac{P}{K} = \frac{P}{Y}\frac{Y}{Y^*}\frac{Y^*}{K} = \frac{\pi u}{v} \tag{3}$$

When assessing how these three variables determine the cyclical dynamics of the profit rate in the USA economy from 1949 to 1975, Weisskopf (1979) states that in the early expansion as well as in the contraction the changes in the profit rate are positively correlated to changes in both the profit share and capacity utilization. In the late expansion, however, the profit share falls and, despite the persistence of (weaker) increases in the capacity utilization, the profit rate falls. Thus, not only the profit rate seems to largely follow the cyclical behavior of the profit share, but also the profit share itself behaves pro-cyclically during most of the business cycle.

Weisskopf (1979) observes that decreases in the profit share (increases in the wage share) can result from higher strength of labor (as in the traditional Marxian approach associated with the concept of reserve army) or lower capacity utilization (due to overhead labor). He distinguishes these two effects by estimating a wage share that is corrected for the effects of capacity utilization (solely representing working power). From these corrected values, the author concludes that the long term fall in the profit rate and the decline in the late expansion phase are largely attributable to increases in the strength of labor, while its cyclical behavior can be strongly accounted by changes in the rate of capacity utilization in the early expansion and contraction phases.

Thus, the cyclical behavior of the corrected profit share is weaker than the one of the uncorrected values, suggesting that the behavior of the latter is largely determined by capacity utilization (at least in the early expansion and contraction). The analysis by Weisskopf (1979) supports the theoretical models of Asimakopulos (1975) and Lavoie (2014) by showing that the profit share is endogenously determined by the rate of capacity utilization.

[5] Note that Steindl (1979) also considers a profit function as an increasing function of capacity utilization.

2.2.2 The Supply Side

Asimakopulos (1975) argues that in a Kaleckian model with overhead labor, labor productivity also varies directly with demand. Following Rowthorn (1981), total labor is given by equation 15:

$$E = E_v + E_f \tag{15}$$

in which $E_v = Y/y_v$ is variable labor, y_v is the output per variable labor ratio (i.e., productivity of variable labor), and E_f is fixed labor. Assuming that the productivity of variable labor is fixed and that the productivity of fixed labor is given by the level of output at full capacity, the relation between overhead and variable labor at full capacity is given by the f ratio in equation 16:

$$f = \frac{E_f}{E_v^*} \tag{16}$$

in which E_v^* is the amount of variable labor at full capacity. Given that $E_v^* = Y^*/y_v = E_v/u$, output per worker (y) is given by equation 17:

$$y = \frac{Y}{E} = \frac{Y}{E_v + E_f} = \frac{y_v}{1 + f/u} \tag{17}$$

which is a positive function of capacity utilization (at a decreasing rate). According to Lavoie (2014), this positive relation between output and productivity in the short-run illustrates Okun's law, which states that the elasticity of output with respect to the employment rate is larger than one.

2.2.3 The Demand Side

There are a number of important implications of considering overhead labor that are related to the demand side. In the next section we explore these implications in a model that assumes that overhead labor does not save, while, in the following section, this assumption is relaxed.

No Saving Out of Overhead Income

Different models have assessed whether the paradox of costs also applies to overhead costs (Rowthorn, 1981) and the implications of considering overhead labor when firms apply target return pricing (Lavoie, 1996, 2009, 2014). In a model that considers a simple Kaleckian mark-up pricing equation, the paradox of costs also applies to overhead costs. Considering that overhead labor earns a multiple $\sigma > 1$ of workers' wages (given by $\bar{W}$), the average wage rate ($\bar{w}$) is given by equation 18.

$$\bar{w} = \frac{\bar{W}E_v + \sigma\bar{W}E_f}{E} \tag{18}$$

Given the relation between overhead labor and direct labor defined in equation 16, unit costs (UC) are expressed in equation 19 below:

$$UC = \frac{\bar{w}E}{Y} = \frac{\bar{W}}{y_v}\left(1 + \frac{\sigma f}{u}\right) \tag{19}$$

Taking the price formation equation expressed by equation 20, in which a mark-up is added to unit direct costs, the profit rate as determined by the cost side (PC curve) is given by equation 21 and represents the amount of profits that is created at each level of capacity utilization (Rowthorn, 1981).

$$p = (1+m)\bar{W}y_v^{-1} \tag{20}$$

$$r^{PC} = \frac{\pi^{PC}u}{v} = \frac{(p-UC)}{p}\frac{u}{v} = \frac{mu - \sigma f}{v(1+m)} \tag{21}$$

The profit rate that is determined by demand conditions (ED curve) is given by the equilibrium between the saving function (equation 4) and the investment function (equation 5), rendering equation 22.

$$r^{ED} = \frac{f_0 + f_2 u}{s_p - f_1} \tag{22}$$

Both the ED and PC curves are upward sloping in the (u, r) space. An increase in overhead costs (an increase in σf) will decrease the profit rate that is achievable at a certain capacity utilization level. However, capacity utilization will also increase, compensating this effect and leading to an overall higher profit rate. Thus, in this model, the paradox of costs also applies to overhead costs (Lavoie, 2009, Rowthorn, 1981).

Lavoie (1996, 2009) amends Rowthorn's (1981) model by assuming target-return pricing. The author argues that most firms nowadays can pass additional overhead costs onto consumers by raising prices. In target-return pricing this will come about as firms set prices so a certain rate of return on capital is achieved at a standard (or normal) rate of capacity utilization. This means that the mark-up set over unit direct costs will be itself a function of overhead costs (Lavoie, 2014, ch. 5) as follows:

$$m^{'} = \frac{r_n v + \sigma f}{u_n - r_n v} \tag{23}$$

in which r_n is the rate of return at normal capacity utilization (u_n).

In this case, prices will be given by equation 24 below:

$$p = (1+m^{'})\frac{\bar{W}}{y_v} = \left(\frac{u_n + \sigma f}{u_n - r_n v}\right)\frac{\bar{W}}{y_v} \tag{24}$$

Thus, the profit share from the cost side is given by equation 25:

$$\pi^{PC} = \frac{p - UC}{p} = \frac{(\sigma f + r_n v)u - (u_n - r_n v)\sigma f}{u(u_n + \sigma f)} \tag{25}$$

The derivative of the profit share from the cost side with respect to overhead costs is given by equation 26. As the denominator is positive and $u_n > r_n v$ so the mark-up in equation 23 is positive, the sign of this derivative is determined by the $u - u_n$ term.

$$\frac{d\pi^{PC}}{d(\sigma f)} = \frac{(u - u_n)(u_n - r_n v)f}{u(u_n + \sigma f)^2} \tag{26}$$

In case capacity utilization is higher than its normal value, the profit share curve given by the cost side will shift upwards with an increase of overhead costs. The converse will happen if the economy is operating at level which is lower than normal capacity utilization.

As an increase in overhead costs leads, in this case, to higher price levels, it will have a more limited impact on effective demand, with the possibility of the paradox of costs no longer holding. The rate of profit given by the cost side (PC curve) is given by substituting π in equation 3 by its expression in equation 25. This renders the following profit rate expressed by equation 27 and its derivative with respect to overhead costs is given by equation 28. The sign of this derivative now depends on the level of capacity utilization with respect to the normal capacity utilization rate (if capacity utilization is higher than its normal value, the derivative will be positive, meaning a higher rate of profit at a given rate of capacity utilization).

$$r^{PC} = \frac{(\sigma f + r_n v)u - (u_n - r_n v)\sigma f}{v(u_n + \sigma f)} \tag{27}$$

$$\frac{dr^{PC}}{d(\sigma f)} = \frac{(u - u_n)(u_n - r_n v)}{v(u_n + \sigma f)^2} \tag{28}$$

The rate of profit from the demand side is still given by equation 22 in this case, and its intersection with the curve expressed by equation 27 renders the equilibrium values for the rate of profit and capacity utilization (note that the two curves are still upward sloping). Increases in overhead costs (σf) make the PC curve spin counter-clockwise around the point defined by u_n and r_n, while the ED curve remains unaffected. Therefore, at low levels of capacity utilization ($u < u_n$), increases in overhead costs lead to higher capacity utilization and higher profit rate (so the paradox of costs holds), while at high levels of capacity utilization ($u > u_n$) there is a decrease of the value of these variables and the paradox of costs no longer applies to overhead costs, with increases in these costs possibly hampering accumulation even if it is assumed that overhead labor does not save.

Lavoie (2014) also explores the implications of this model on the assessment of the demand regime of the economy and the understanding of the business cycle. From equation 25, the profit share from the cost side will be determined by the rate of capacity utilization, while the profit share from the demand side will also be determined by it (as in models without overhead labor).This means that the profit share and capacity utilization will be jointly determined by the intersection of the curves expressed by equations 25 and 29 (the latter being determined by the intersection of the curves represented by equations 4 and 5).

$$\pi^{ED} = \frac{f_0 v}{(s_p - f_1)u} + \frac{f_2 v}{(s_p - f_1)} \tag{29}$$

Once again, the effect of increasing overhead costs on capacity utilization and on the profit rate will depend on whether capacity utilization is below or above its normal rate. The relation between the profit share and capacity utilization is still given by the slope of the π^{ED} curve, which is not affected by changes in overhead costs. If capacity utilization is higher than its normal value and the π^{ED} curve is positively sloped in the (u, π) space, an increase in overhead costs will decrease the profit share, which will be accompanied by a lower capacity utilization rate. At low utilization rates ($u < u_n$), however, the profit share and capacity utilization will increase. In the case of a negatively sloped π^{ED} curve, the effect on capacity utilization is the same, but the profit share goes on the opposite direction.

Lavoie (2014) notes that increases in the target rate of profit can take the profit share to any direction, depending on the slope of the demand curve. Increases in the target rate of profit will always drive the π^{PC} and r^{PC} curves up. If, for instance, the π^{ED} curve is negatively sloped, the net effect of an increase in r_n will be a lower rate of capacity utilization, a higher profit share, and a lower rate of profit. In case of a positively sloped π^{ED} curve, the profit share would decrease together with the lower capacity utilization and profit rates. Thus, the profit share cannot be considered a good indicator of firms' profitability - this is another argument to questioning Bhaduri and Marglin's (1990) investment function.

Finally, Lavoie (2014, 2017) argues that Kaleckian models with overhead labor and either upward or downward sloping π^{ED} curve can reproduce a business cycle that resembles what some authors identify as the predator-prey cycle described by Goodwin (1967)[6]. The rationale is that the business cycle is driven by non-capacity generating semi-autonomous expenditures which are debt-financed (Fiebiger and Lavoie, 2017) and that the downturn is determined by fiscal and monetary policies. In these conditions, a Kaleckian model can also generate a clockwise business cycle (in the (u, π) space).

Saving Out of Overhead Income

The second impact on the demand side of considering overhead labor is to assume that it has a different consumption behavior than the one of workers. This assumption has sound ground as empirical evidence shows that on average supervisors earn more than productive workers (Mohun, 2014) and that saving rates increase across income quintiles (Carvalho and Rezai, 2015).

Saving out of overhead income is considered by Nichols and Norton (1991), who assume that overhead labor earns more than direct labor and have a smaller propensity to save than do capitalists. The authors conclude that overhead labor may impact the accumulation rate in ambiguous ways and that the effect will ultimately depend *"upon whether the overhead class is more important to aggregate demand or to aggregate supply as a source of saving funds"* (Nichols and Norton, 1991, p. 51).

In a more complex model that considers target return pricing, Lavoie (2009) sets the saving rate as a function of retained earnings by corporations, overhead labor saving out of their salaries and capital incomes, and consumption out of capital gains. The author shows that increases in overhead costs will have a smaller effect on aggregate demand. Thus, when capacity utilization is above the normal rate the negative effect of increasing overhead costs will be reinforced and when capacity utilization is below the normal rate the positive effect might be canceled.

2.3 A Class Approach to Kaleckian Growth and Distribution Model

Despite considering the effect of overhead labor and breaking the traditional bipolar class depiction, the contributions mentioned in section 2.2 do not fully pursue a class related approach. However, an increasing number of authors (Dutt, 2017, Palley, 2015, 2017*a*) suggests that a better understanding of inequality would be allowed for by surpassing the traditional analysis of functional income distribution.

On the one hand, the argument goes back to Pasinetti's (1962) argument that if it is assumed that workers save some portion of their income, it should also be assumed that they own part of the capital stock and, thus, earn a share of profits. Therefore, the simple correspondence between profit earners and capitalists is inaccurate if one assumes saving out of wages. On the other hand, the correspondence between wage earners and workers is also fairly inaccurate. Firstly, data compiled by Mohun (2016) reveals that more than half of USA capitalists tax units income derived from "labor income" in 2012. Secondly, there is a clear difference between the average wage income of managers and the one of ordinary workers, with the first group earning higher levels of wages than the latter one (Mohun, 2014), which supports the hypothesis that these two groups must have different consumption behaviors.

Therefore, not only the income of each class derives from mixed sources, but also the idea that the wage share is a good measure of inequality is misleading (Dutt, 2017). This has important implications in terms of empirical studies that try to determine the demand regime of an economy, as well as to the theoretical models.

[6] Stockhammer (2017*b*) argues that a pseudo-Goodwin cycle can result in a Minsky model in which demand is wage-led and there is a reserve army distribution function.

In a quite simple model, in which there are two classes that earn some amount of wages and some amount of profits, Palley (2017*b*) explores the implications of the distribution of wages in determining the demand regime of an economy. Assuming that capitalists-managers earn a larger share of profits than workers and that workers earn a larger share of wages than capitalists, the saving ratio is given by equation 30:

$$g^s = \frac{s_L[\varphi_L(1-\pi)u + \sigma_L \pi u] + s_K[(1-\varphi_L)(1-\pi)u + (1-\sigma_L)\pi u]}{v} \tag{30}$$

in which s_L is workers' propensity to save, φ_L is workers' share of the wage bill, σ_L is workers' share of the capital stock, and s_K is capitalist-managers' propensity to save (assumed to be larger than s_L). Increases in the profit share will redistribute income to capitalists-managers and increase aggregate savings, whereas an increase in workers' share of the wage bill (φ_L) or workers' share of the capital stock (σ_L) decreases the saving rate.

Palley (2017*b*) notes that the derivative of capacity utilization with respect to the profit share[7] depends on workers' share of the wage bill and of the capital stock, as well as on the profit share. Therefore, while increases in workers' shares of labor or profit income always increase aggregate demand, the assessment of a demand regime in terms of the profit share is more complex.

If the capital ownership share of workers' is high, increasing the profit share might lead to higher growth, emulating a profit-led regime. On the other hand, if workers' wage bill share is high, increases in the profit share will lead to lower growth, suggesting a wage-led regime. The rationale behind this is simply that workers consume more than capitalists-managers, so if their share in one type of income is high, increasing this income will have strong effects on aggregate demand. Thus, the assessment of the demand regime in terms of functional income distribution can suggest a profit-led regime that comes about due to high workers' ownership share, or the contrary: *"the economy may be profit-led only because of policies that have changed the distribution of wages and lowered workers' share"* (Palley, 2017*b*, p. 60). Yet, increases in the workers' wage share will always lead to higher growth and can turn a profit-led economy into a wage-led one. Palley (2017*a*) further explores the implications of this model on the assessment of the relation between inequality and growth, showing that a higher participation of workers on the wage bill lowers inequality and increases growth.

A similar model with three classes is explored by Palley (2015) and is the starting point of our empirical estimations. The author assumes the existence of a class conflict on the division of the wage bill in a model based on features from Kalecki's and Goodwin's theories. Also in this case, increasing the workers' share of wages without increasing the wage share unambiguously leads to lower saving out of wages without affecting investment.

Data provide by Mohun (2014) shows that this might have had important implications in the USA economy since the 1960s. While the participation of the non-working-class on employment has increased very little, its participation on wages has increased by 15 percentage points from 1964 to 2010. As the profit share also increased in this period, this meant a strong decrease of the workers' share on national income. Indeed, the total adjusted wage share decreased from 66.8% in 1964 to 61.3% in 2010 while the workers' share on GDP decreased from 45.4% to 32.7%. Yet, the non-working-class managed to increase its share in national income despite this decrease of the wage share, from 21.4% to 28.6% in the same period. It is likely that part of the non-working-class wage income and part of the profit income go to the same group of individuals, so these numbers testify the magnitude of the income redistribution that took place in the USA economy in the last decades.

[7] The author assumes an investment function that includes the profit share, profit rate, and capacity utilization as explanatory variables.

As Palley (2015) states, the consideration of the wage bill division between workers and managers is a procedure to introduce the effects of personal income distribution. In his model, because this division is endogenous, the character of the demand regime (in terms of wage- or profit-led) of the economy is itself endogenous. Therefore, this strong income redistribution to the USA middle class in the past decades, with the workers' share of income decreasing, might have led the USA economy to become (more) profit-led, following a decrease in the average propensity to consume out of wages. Empirically testing this might provide interesting insights on what is driving the demand regime of the USA economy.

3 Aim of This Study

The basic rationale of Kaleckian growth and distribution models in a closed economy[8] is that if increases in the wage share lead to increases in consumption that overcompensate the negative stimulus of lower profitability on investment, the economy will be wage-led. Increases in the wage share that result from increases in the workers' wage share are likely to enhance the positive effect on consumption, increasing the likelihood of an overall positive effect on aggregate demand (or, at least, diminishing the negative effect). Conversely, if the increase in the wage share is due to an increase in the income share of overhead labor, the impact on consumption is likely to be weaker.

This can be better explored by analyzing the derivative of capacity utilization with respect to the profit share in equation 31 (Bhaduri and Marglin, 1990). Assuming the Keynesian stability condition, the denominator of equation 31 is positive (the derivative of savings, S_u, with respect to capacity utilization is larger than the derivative of investment with respect to capacity utilization, I_u) and, thus, the sign of the derivative is determined by the sign of the nominator. In case the positive effect of a rise in the profit share on investment (I_π), is larger than the positive effect on saving (S_π), capacity utilization will increase with an increase in the profit share (profit-led demand regime). Yet, following Palley's (2015) argument, it is likely that S_π is larger in case the increase in the profit share results from a decrease in the workers' share in income than if it results from a decrease of the managers' share, rendering a wage-led regime more likely in the former case.

$$\frac{du}{d\pi} = \frac{I_\pi - S_\pi}{S_u - I_u} \tag{31}$$

Empirically, this can be tested by estimating an aggregate model in order to determine the sign of equation 31 in case of a redistribution of income from workers to profits and from managers to profits. The aim of our study is to empirically explore this in the case of the USA economy and, therefore, underline what might be driving the results obtained by this method and show how other considerations could lead to different results. Given that we use the capacity utilization measured by the Federal Reserve instead of the deviations from an HP-filtered trend, we are also able to estimate a long-run aggregative model for the capacity utilization and the wage share[9].

4 Empirical Model

In this section, we explore how the division of wages between workers and managers affects the results provided by the aggregative-systems approach. The first model estimates a standard model accounting for the relation between capacity utilization and the profit share, but also accounting for a level relation, which is a modification

[8] In an open economy the mechanisms would be more complex, but, to some extent, the same rationale can be applied.

[9] See Blecker (2016) for a discussion on the difference between capacity utilization measured by these two alternatives.

of the standard aggregative models. The second one explores what might be driving these results by splitting the wage share between workers and managers.

4.1 Estimation Strategy

Our estimation strategy builds on Barbosa-Filho and Taylor (2006) and Carvalho and Rezai (2015). These authors estimate a vector autoregressive (VAR) model including capacity utilization and the wage share as endogenous variables ($Y_t = [u_t, w_t]$, in which u_t is capacity utilization and w_t is the wage share) and find a profit squeeze distribution schedule and a profit-led aggregate demand regime. Our model includes the share of workers' income (wc) and the share of supervisors' income (nwc) separately ($Y_t = [u_t, wc_t, nwc_t]$). This allows us to capture how capacity utilization reacts to changes of the profit share that are due to a change in the workers' share or due to a change in the supervisors' share. It is expected that the impact of an increase in the workers' share leads to a higher increase (or, at least, a smaller decrease) in capacity utilization than an increase in the supervisors' share. It is important to note, however, that as all variables are taken as endogenous in our model, a change in the workers' share, for instance, will also impact the non-working-class share.

As our variables are non-stationary, we test for cointegration by following Johansen's (1995) procedure. In case there is cointegration, a vector error correction model (VECM) is estimated, which is represented in equation 32 below:

$$\Delta Y_t = v + \alpha\beta' Y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta Y_{t-1} + u_t \tag{32}$$

where v is a Kx1 vector of parameters, with K being the number of variables, α is a Kx1 vector containing the adjustment coefficients, β' is a 1xK vector containing the cointegrating equations, $\Gamma\Delta Y_{t-1}$ is a KxK matrix providing short run dynamics of the model, and u_t is a Kx1 vector of white noises.

In this case, it is possible to capture both the level (long-run) and the difference (short-run) relation among the variables. This is an interesting feature, as Blecker (2016, p. 387) points out the need of such approach by suggesting that more research should be done to *"explicitly compare short-run and long-term effects of distributional shifts on output or utilization as well as economic growth using appropriate econometric techniques"*. Thus, before estimating the model which splits the wage share, we explore how the wage share and capacity utilization are related in the long-run.

4.1.1 Database

Table 1 details our database. Given the data availability, our sample consists of 44 annual observations, covering the period from 1967 to 2010. All our variables are taken as logarithm. For the capacity utilization rate we chose to work with the data provided by the Federal Reserve (Fed) instead of using the deviations of current output from HP-filtered output. Blecker (2016) shows that the use of an HP-filter to measure capacity utilization can lead to some information loss. The data provided by the Fed, on the other hand, relies on surveys on firms' capacity and output. The wage share is provided by AMECO and represents the adjusted sum of compensation of employees (wages and salaries) and employers' social contributions divided by GDP at factors' costs. Mohun's (2014) data provides the share of production and supervisory labor on total compensation of employees. In order to have the ratio of each of these income categories by GDP at factors' cost, we multiply the shares given by Mohun (2014) by the wage share given by AMECO[10].

[10]Thus, we assume that public sector wages are split in the same way as in the private sector.

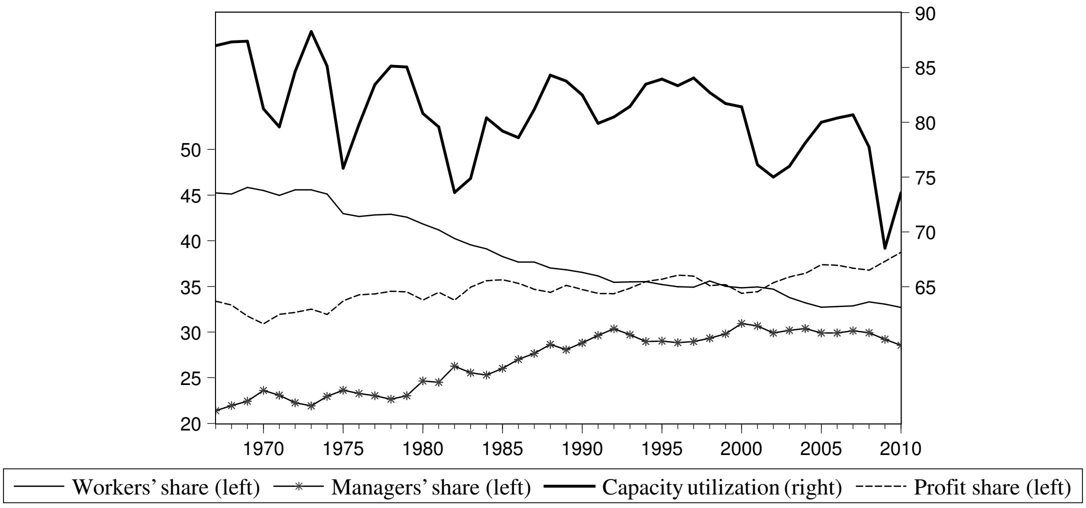
Tab. 1: Datasources

Variable	Name	Source	Unit	Time Range .
u	Industrial Capacity Utilization (total index)	Federal Reserve (2017)	Percentage	1967 to 2016
w	Adjusted Wage Share (total economy)	AMECO (2017)	Percentage	1960 to 2016
w_{nwc}	Share of Supervisory Wages on Total Wages	Mohun (2014)	Percentage	1964 to 2010

Figure 1 reports our series and allows us to draw some stylized facts. Firstly, regarding the workers' income share, it is not possible to identify a cyclical dynamic, especially because it has a strong tendency of decline during the period and shows little volatility during the business cycle. This supports the claim by Kalecki (1990) that the share of hourly wages tends to be relatively stable over the cycle. Secondly, the supervisors' share shows a clear positive trend from 1967 to 2007 as well as cyclical fluctuations. Overall, when capacity utilization is high, the supervisors' share is low and the converse happens when capacity utilization is low. This reflects the fact that supervisors' income is proportional to capacity, so when output grows, it does not grow proportionately. This counter-cyclical behavior of the supervisors' share on income is also observed by Kalecki (1990). Finally, the profit share seems to follow a pro-cyclical behavior but there is no clear pattern regarding which variable is anticipating the other.

Regarding capacity utilization, it shows a tendency of having lower average values. Since the 1980s, the high values observed in the previous decade were no longer observed and the peak of each cycle seems to be characterized by a lower capacity utilization rate than the previous peak. Moreover, the 1980s and 1990s present an overall smaller variation of capacity utilization rates which is not present in the 2000s, as this decade has shown higher volatility and has been characterized by strong reductions of this variable after the dot-com bubble and the global financial crises.

Fig. 1: Income Distribution and Capacity Utilization - 1967 to 2010 (%)



Sources: Mohun (2014), AMECO, and Fed. Author's own elaboration.

4.2 Estimation Results

This section presents the estimation results. Firstly, we discuss the results regarding the unit root tests for all the variables. Secondly, we report the results of the estimated models. All reported models respect the assumptions underlying the econometric methods applied, so they have white noise residuals and are dynamically stable. Yet, none of the models have normal standard errors.

4.2.1 Unit Root Tests

The assessment on the integration order of each series follows the Phillips-Perron and KPSS tests. At the 10% significance level, there is evidence that all series are non-stationary (in the specifications with a constant). Therefore, all the variables are taken as I(1).

Tab. 2: Unit Root Tests

	Phillips-Perron Test						KPSS Test	
Model	Constant, Trend		Constant		None		Constant, Trend	Constant
Ho	1 UR		1 UR		1 UR		0 UR	0 UR
	t-stat	p-value	t-stat	p-value	t-stat	p-value	LM stat.	LM stat.
ln_u	-3.049	0.132	-2.586	0.104	-1.929	0.052	0.174	0.525
d(ln_u)	-9.297	0.000					0.379	0.378
ln_wc	-1.642	0.759	-0.637	0.852	-3.925	0.000	0.162	0.810
d(ln_wc)	-5.202	0.000					0.112	0.132
ln_nwc	-0.897	0.947	-1.895	0.332	1.670	0.975	0.173	0.762
d(ln_nwc)	-6.479	0.000					0.181	0.341
ln_w	-2.910	0.170	-0.441	0.893	-1.165	0.219	0.082	0.736
d(ln_w)	-5.791	0.000					0.080	0.178

Note: In the KPSS test, the critical values at the 10% significant are equal to 0.119 and 0.347 for the model with constant and trend and the model with constant respectively.

4.2.2 Functional Income Distribution in the Long-Run

This section explores the model which only includes capacity utilization and the wage share as endogenous variables. Thus, it reproduces the models that usually are tested under the aggregative approach, but allows for a long-run relation among the variables which studies that use capacity utilization as a deviation from an HP-filtered trend fail to capture. Information criteria SC and HQ suggest a lag length of one or two, respectively. Since it is required to have at least two lags in the underlying VAR (so the VECM has one lag), we start with a VAR model with two lags, but one more lag is added in order to obtain white noise residuals in the VAR model. Given the data pattern, a model with linear trend and intercept in the error correction part seems adequate. This model would have one cointegrating equation according to both the trace and maximum eigenvalue tests.

In this case, the Granger-causality test must be done following a slightly modified procedure as suggested by Toda and Yamamoto (1995). Table 3 reports the statistics related to this test in this case. We cannot reject the hypothesis that the level of the wage share does not Granger-cause the level of capacity utilization, but there is evidence of Granger-causality in the other direction.

Tab. 3: Specification 1: Granger-Causality Test

Ho	Chi-sq	df.	Prob.
LN_W does not Granger-cause LN_U	1.583	3	0.6633
LN_U does not Granger-cause LN_W	20.593	3	0.0001

The output of the model is reported in table 4 and shows the long-run relation among the variables (*CointEq1*) and their short-run relation (*Error Correction*). Regarding the long-run part, the cointegrating equation shows that the level of the variables are positively correlated. Moreover, from the short-run part it is possible to see that both variables adjust themselves to deviations from this "equilibrium" relation, as the adjustment coefficients are significant for both of them[11]. The short-run part of the model shows a negative short-run effect of the the wage share on capacity utilization (as in the previous model) but also a negative effect of capacity utilization on the wage share. The adjusted R^2 values for both of these variables are higher than in the previous model, suggesting that the cointegration equation improves the explanatory power of our model.

Tab. 4: Specification 1: Model Output

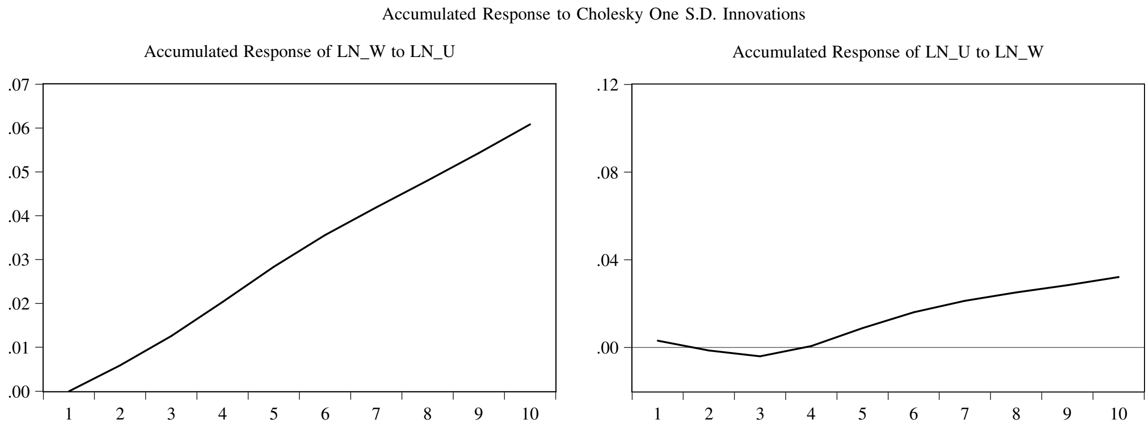
Cointegrating Eq:	CointEq1	
LN_U(-1)	1	
LN_W(-1)	-1.039***	
	(0.262)	
C	-0.048	
Error Correction:	D(LN_U)	D(LN_W)
CointEq1	-0.456**	0.191***
	(0.217)	(0.049)
D(LN_U(-1))	0.296	-0.018
	(0.209)	(0.048)
D(LN_U(-2))	-0.095	-0.096*
	(0.208)	(0.047)
D(LN_W(-1))	-1.405**	-0.042
	(0.599)	(0.136)
D(LN_W(-2))	-0.322	0.093
	(0.643)	(0.146)
C	-0.006	-0.003**
	(0.006)	(0.001)
R-squared	0.402	0.420
Adj. R-squared	0.316	0.337

Note: Standard errors in parenthesis. Significance levels: * p<0.1, ** p<0.05, *** p<0.01.

Impulse-Response Functions (IRF) reported in figure 2 show that the wage share is positively affected by a shock on the capacity utilization and that, despite the negative impact of the wage share on capacity utilization in the first periods, this effect does not linger and becomes positive over time.

[11] Adjustment coefficients indicate whether each variable has a tendency to "correct" itself with respect to this long-run equilibrium relation. For this to happen, the adjustment coefficient must be significant and less than one.

Fig. 2: Specification 1: Accumulated Impulse-Response Function



Note: Cholesky ordering: 1.ln_w, 2.ln_u.

In conclusion, the VECM model provides additional information concerning the relation among the two variables of interest that is lost when only accounting for their short-run dynamics. Our results suggest that, considering the long-run relation among the variables, the profit-led conclusion does not hold. The effect of a higher wage share on capacity utilization would actually be positive, but the Granger-causality test does not support this causality direction and variance decomposition shows that just a small percentage of the variance of capacity utilization is due to the wage share. Yet, our results suggest that a short-run model that only estimates short-run dynamics by using an HP-filtered trend tends to capture a negative causality from wages to capacity utilization that does not hold in the long-run. On the other hand, our model corroborates the conclusion that the wage share positively reacts to changes in capacity utilization and that an important part of the variance of the wage share is due to capacity utilization.

4.2.3 Functional and Wage Distributions in the Long-Run

This section reports the same model as in the previous section but we split the wage share between the two classes. In this case, the SC and HQ criteria suggest starting with a model that includes one lag of each dependent variable. However, this would render a VECM model without any short-run relations, so we applied the cointegration tests to a VAR model with two lags[12]. Once again, a model with linear trend and intercept in the error correction part is adopted, for which the cointegration tests suggest one cointegrating equation.

Granger-causality tests are once again applied following Toda and Yamamoto's (1995) procedure. In this case, there is no support for Granger-causality among the variables, except for Granger-causality from capacity utilization to the non-working-class share.

[12]Determining the lag length by the R^2 would lead to a VAR model with two lags.

Tab. 5: Specification 2: Granger-Causality Test

	Chi-sq	df	Prob.
LN_WC does not Granger-cause LN_U	1.405	2	0.4953
LN_NWC does not Granger-cause LN_U	1.691	2	0.4294
LN_U does not Granger-cause LN_WC	2.592	2	0.2737
LN_NWC does not Granger-cause LN_WC	2.187	2	0.3351
LN_U does not Granger-cause LN_NWC	7.219	2	0.0271
LN_WC does not Granger-cause LN_NWC	1.585	2	0.4528

The output of this model is reported in table 6. The cointegrating relation suggests a positive and statistically significant (at the 10% level) relation between the three variables, suggesting that higher levels of capacity utilization are associated with higher levels of the non-working-class income share and of the working-class income share (and, thus, negatively associated with the profit share). The adjustment coefficients are significant for capacity utilization and for the non-working-class share, indicating that these variables tend to adjust themselves to this "equilibrium relation" (i.e., if the non-working-class share is lower than what this long-run relation would define given the value of the other variables, it will increase in the next period), while the workers' share does not. The short-run part of the model indicates that capacity utilization has a negative impact on the two income shares, while these two income shares have a negative impact on capacity utilization. Moreover, each income share has a negative impact on the other.

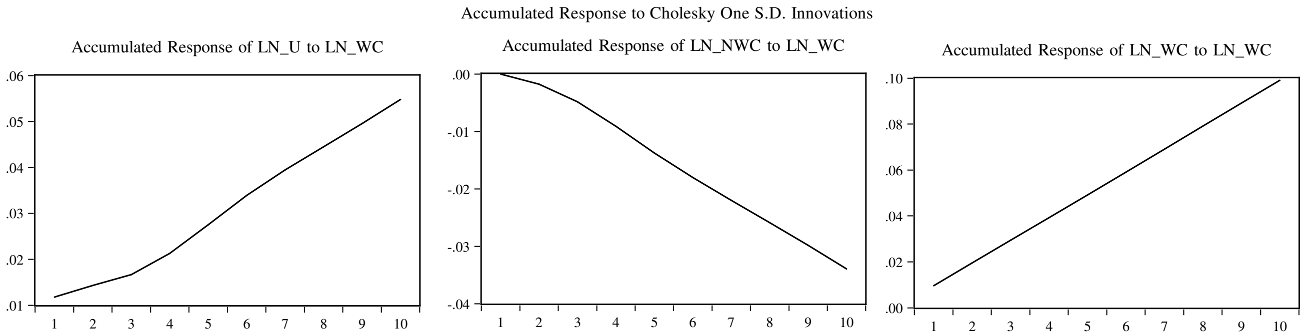
Tab. 6: Specification 2: Model Output

Cointegrating Eq:	CointEq1		
LN_U(-1)	1.000000		
LN_WC(-1)	-0.800421		
	(0.26022)		
LN_NWC(-1)	-0.649727		
	(0.24531)		
C	0.658915		
Error Correction:	D(LN_U)	D(LN_WC)	D(LN_NWC)
CointEq1	-0.413874	0.062582	0.304142
	(0.15926)	(0.05423)	(0.10893)
D(LN_U(-1))	0.293583	-0.009046	-0.032437
	(0.18355)	(0.06250)	(0.12555)
D(LN_WC(-1))	-1.141238	0.012941	-0.272031
	(0.54407)	(0.18526)	(0.37214)
D(LN_NWC(-1))	-0.607471	-0.094641	0.122698
	(0.24236)	(0.08253)	(0.16578)
C	-0.006435	-0.006916	0.003160
	(0.00680)	(0.00231)	(0.00465)
R-squared	0.393238	0.114691	0.244009
Adj. R-squared	0.327642	0.018982	0.162280

Note: Standard errors in parenthesis. Significance levels: * p<0.1, ** p<0.05, *** p<0.01.

Figure 3 reports the accumulated IRF of an impulse on the workers' share assuming that it has an instantaneous impact on capacity utilization but not on the non-working-class share (thus, in the first period, there is a redistribution of income from profits to workers' wages). It is possible to see that an increase in capacity utilization and a decrease in the non-working-class share will follow an increase in the workers' share. Given the mean value of the income shares, an increase of one standard deviation of the workers' income share will lead to an increase of 3.80 percentage points (p.p.) of the workers' income share and a decrease of 0.91 p.p. of the non-working-class share at the tenth period, rendering a fall of about 2.89 of the profit share[13]. In this case, the increase of the capacity utilization will be of around 4.43 p.p.

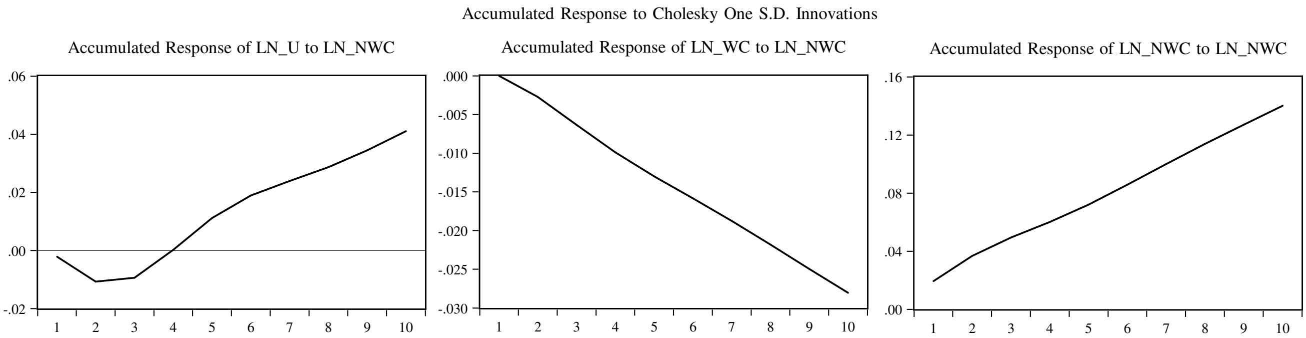
Fig. 3: Specification 4: Accumulated Impulse-Response Function - Shock in ln_wc



Note: Cholesky ordering: 1. ln_nwc; 2. ln_wc; 3. ln_u.

Figure 4 reports the response to a shock on the non-working-class income share assuming that it has an instantaneous impact on capacity utilization but not on the working-class share. In this case, there will be a small decrease of capacity utilization in the first periods, but by the later periods the effect will be positive. Moreover, a fall in the working-class share will also follow. Given the mean value of the variables, an increase of one standard innovation of the non-working class share results, by the tenth period, in an increase of 3.76 p.p. of this share and a decrease of 1.08 p.p. of the working-class share, rendering a decrease of 2.69 p.p. in the profit share. Regarding the capacity utilization, it increases by 3.32 p.p. Therefore, the initial negative impact of an increase in the wage share on capacity utilization (in section 4.2.2) is due to the non-working-class share rather than the working-class share.

Fig. 4: Specification 4: Accumulated Impulse-Response Function - Shock in ln_nwc



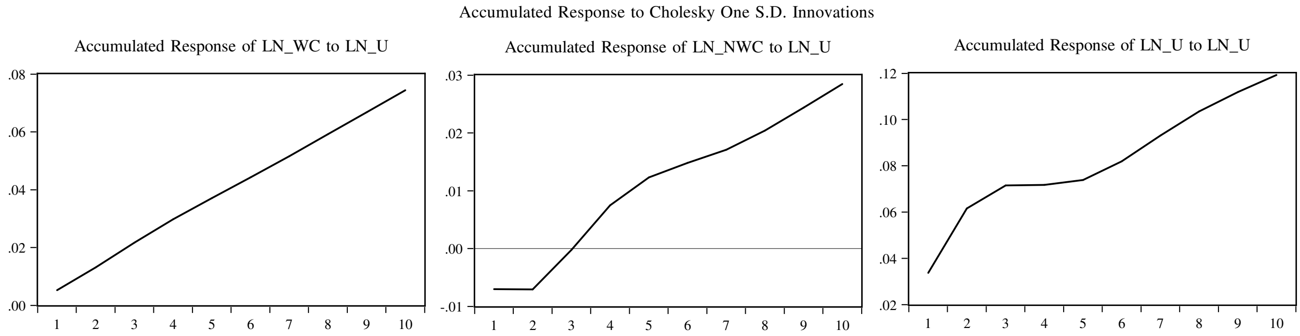
Note: Cholesky ordering: 1. ln_wc; 2. ln_nwc; 3. ln_u.

Finally, we estimate an accumulated IRF for a shock in capacity utilization assuming that it has a simultaneous impact on both shares. In this case it is possible to see that both shares have a positive response, although

[13]These values have been calculated by converting changes in logarithm into changes in the level variables at their mean values. For the working-class share, for instance, it is equal to: $\Delta wc = \Delta ln\_wc * \bar{wc}$.

the short-run response of the non-working class share is negative. Given the mean value of our variables, this means that an increase of one standard deviation in capacity utilization will lead, after ten periods, to an increase of 9.64 p.p. of it, an increase of the working-class share by 2.86 p.p., and an increase of the non-working class share by 0.76 p.p. Roughly, this means that for every increase of one percentage point in capacity utilization, the profit share is expected to fall by 0.38 p.p. (both values at the end of the tenth period and assuming no other shock in the meantime).

Fig. 5: Specification 4: Accumulated Impulse-Response Function - Shock in ln_u



Note: Cholesky ordering: 1. ln_u; 2. ln_wc; 3. ln_nwc.

Overall, the results of this section allow for a better understanding of the dynamics underlying the results in section 4.2.2. Regarding the demand regime, when the profit share decreases by one percentage point due to a shock in the working-class share, capacity utilization increases by 1.53 p.p. (after ten periods). When this decrease is due to a shock in the non-working-class share, the increase of capacity utilization is of 1.24 p.p. (after ten periods). Granger-causality tests, however, do not support the hypothesis that each of these shares Granger-cause capacity utilization, so there is no support for claim that the USA was under either a wage- or a profit-led regime.

The profit-squeeze conclusion still holds in this case, as a one percentage point increase in capacity utilization leads to a decrease in the profit share (after some period, at least). The workers' share seems to be the one that increases most with this increase in capacity utilization (0.30 p.p. by the tenth period), although we could not identify Granger-causality in this direction. On the other hand, the non-working class share increases very little (0.08 p.p. by the tenth period), which might be the result of two phenomenons discussed by Lavoie (2014). On the one hand, the non-working-class income, due to its overhead characteristic, is expected to be roughly stable through the cycle, so increases in GDP will render a lower participation of this class on national income. On the other hand, firms are likely to be more prone to increase managers' wages in the boom phase of the cycle. Considering the magnitude of the increase in the managers' share over the period under analysis, it is quite likely that this has taken place and possibly overcame the first phenomenon, which is observed in the first periods.

As a profit share decrease will take place along with an increase in capacity utilization, profitability can still increase, and, in this case, the paradox of costs will hold. In this sense, our results break the Goodwin cycle narrative as the downturn of the cycle does not seem to be caused by the decrease in the profit share, even if this actually takes place. Therefore, an analysis of the business cycle based only on the dynamics between capacity utilization and income distribution might be lacking other mechanisms that can explain it.

5 Conclusion

Most empirical studies that test the demand regime of the USA do not take into account the fact that the wage income is divided between the workers and the managers classes. The data provided by Mohun (2014) shows that wage earners are likely to form a very heterogeneous group, so empirical research should account for this in order to have a more precise picture of income inequality and introduce a class perspective. In this study, we investigated whether taking these two classes separately leads to different estimates of an aggregate-systems model in which income distribution and capacity utilization are simultaneously determined.

The VECM models suggest that despite a (weak) profit-led dynamics identified in the short-run, this is not sustained across time, so sustained higher levels of the profit share will not lead to sustained higher levels of capacity utilization, as the overall effect is statistically neutral. This supports the claim by Blecker (2016) that most aggregative studies find a profit-led result that might only pertain to the short-run behavior of capacity utilization. Moreover, it appears that the short-run profit-led behavior is determined by the non-working-class rather than the working-class.

Thus, we fail to confirm the possibility raised by Palley (2015, 2017*b*) that the redistribution of income from workers to managers has increased the likelihood of a profit-led regime in the USA, as our result already shows that considering the level relation among the variables, the regime is not profit-led and that the Goodwin cycle mechanism is not a robust explanation for the business cycle. Still, we do identify that an increase in the workers' share of income would lead to higher capacity utilization rates than an increase in the managers' share, but these causality directions are not supported by the Granger-causality tests. One further possibility to test for this is to estimate a threshold VAR or VECM allowing for a regime switch according to the value of the working-class share, in a similar way to Carvalho and Rezai's (2015) study and that could be explored in future research.

Concerning the distribution schedule, we find a negative response of the non-working-class share to increases in capacity utilization (at least in the first periods), which is expected due to its overhead characteristic. This means that there might be an increase in the profit share as capacity utilization rises. If this is the case, there is ground to affirm that studies that only focus in the short-run might be capturing a positive correlation between the profit share and capacity utilization that can be explained by the cyclical impact of overhead labor (Lavoie, 2017). This effect must have become stronger with the increase in the managers' share, as it represents an increase of overhead costs.

However, the model that only includes the wage share suggests that, on average, there would be an increase of the wage share along with capacity utilization. This suggests that labor strength plays some role in determining the functional income distribution, which is also one of the conclusions of Weisskopf (1979). As our results express the average relation between the variables, they cannot capture which effect is likely to prevail in each phase of the cycle, despite suggesting that both of them are important. Weisskopf's (1979) analysis suggests that the profit share does not move in line with capacity utilization only by the late expansion, so it would be pro-cyclical during most of the cycle, which is also what figure 1 suggests. The fall of the profit share by the late expansion would be determined, according to the author, by an increase in labor strength.

Our interpretation of these results is that, despite the short-run effect of an increase in capacity utilization on both wage shares being negative (shown in the short-run part of the VECM models), they are also capturing a positive long-term relation between these variables that can be explained by the fact that at higher capacity utilization levels labor strength is increased and this can lead to higher wage shares. The fact that there has not been a sustained high level of capacity utilization in the USA economy, with a fall in the average capacity utilization across time, might have been one of the determinants of weaker strength of labor (among all the others discussed by Hein (2014) and Stockhammer (2017*a*), for instance). As managers were successful in protecting and increasing their income shares, workers have been the most affected by this and were further impaired by increases in the share of the former class (other mechanisms played a strong role as well, as the Granger-causality test suggests that capacity utilization is not a strong determinant of the workers' share, so other economic and political developments were more significant). Thus, our results regarding the distribution schedule are the combination and interaction of both of these determinants. Another research path would be, therefore, to further explore the determinants of functional income distribution over the business cycle by differentiating what are the cyclical components and what are the trend components.

This was a first approach to the implications of each share of wages on consumption and capacity utilization, with the purpose of underlying what might drive results based only on functional income distribution. We contribute to the literature by suggesting some implications from our study that might be useful for future research on the topic, besides the ones mentioned above. Firstly, our results suggest that studies that follow the aggregative approach by using a HP-filtered trend as a *proxy* to capacity utilization are missing an important mechanism, as Blecker (2016) suggests. Secondly, there is empirical support for considering that the profit share is determined by capacity utilization at least to some extent, so empirical and theoretical models should account for this. Finally, other control variables should be included to allow for a more precise narrative of what drives the business cycle, as the wage share seems to explain a small proportion of the variance of capacity utilization while the Granger-causality tests fail to identify causality in this direction in the VECM models.

In terms of policy implications, our study provides some suggestions based on the average behavior of the USA economy in the past decades. Firstly, there is no ground for reducing the wage share in order to achieve higher levels of aggregate demand as these will not be sustained across time. Secondly, as our results suggest that a higher workers' share does not have a negative impact on capacity utilization, there is no trade-off between improving equality (by increasing the working-class share) and higher levels of economic activity.

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