WIRTSCHAFTS UNIVERSITÄT WIEN VIENNA UNIVERSITY OF ECONOMICS AND BUSINESS

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Working Paper Series
30/2019

INSTITUTE FOR ECOLOGICAL ECONOMICS

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Key words: Wealth, Distribution, Aggregate Demand

JEL codes: D31, D33, E12, E21, E25, E64

Abstract

The paper investigates how including the distribution of wealth changes the demand effects of redistributing functional income. It develops a model with an endogenous wealth distribution and shows that the endogenous rise in wealth inequality resulting from a redistribution towards profits weakens the growth effects of this redistribution. Consequently, a wage-led regime becomes more strongly wage-led. A profit-led regime on the other hand becomes less profit-led and there may even be a regime switch – in this case the short-run profit-led economy becomes wage-led in the long run due to the endogenous effects of wealth inequality. The paper thereby provides a possible explanation for the instability of demand regimes over time.

1. Introduction

For decades, distribution (or more precisely, the functional distribution of income) and its implications for economic growth have been central to Post-Keynesian thought (Kaldor, 1955; Pasinetti, 1962; Kalecki, 1971; Steindl, 1952). Early Post-Keynesian models emphasize the 'wage-led' nature of growth: a rise of the profit share reduces aggregate demand and ultimately also capital accumulation (Rowthorn, 1981; Dutt, 1984; Taylor, 1985). Bhaduri and Marglin (1990) extend these models so as to allow for an ambiguous effect of a higher profit share: if saving rises less than investment, it follows that aggregate demand and capital accumulation increase; the economy is 'profit-led'. The demand regime thus depends on the relative size of these effects, and the question whether it is wage- or profit-led is ultimately an empirical one, albeit with important policy implications. If an economy is wage-led, increasing the wage share would lead to a win-win situation of higher growth and lower inequality. In the case of a profit-led economy, however, the opposite holds, and policy-making thus faces a trade-off between growth on the one hand, and a less unequal functional income distribution on the other hand.

The theoretical possibility of either wage- or profit-led growth in the Bhaduri and Marglin (1990) model sparked a lively debate among Post-Keynesians.[1] The better part of the literature revolves around the question whether the demand or growth regimes are empirically wage- or profit-led in various countries (Barbosa-Filho and Taylor, 2006; Stockhammer and Ederer 2008; Stockhammer et al. 2009; Onaran and Galanis 2014; Kiefer and Rada, 2015). Recently, however, some contributions question the stability of demand regimes and emphasize the difference between short- and long-run effects, which opens up the possibility of regime switching (Nikiforos and Foley, 2012; Palley, 2014a; Blecker, 2016; Nikiforos, 2016). Others show that the inclusion of the personal income distribution (Lavoie, 2009; Palley, 2014b; Carvalho and Rezai, 2016; Palley, 2017a) or financial variables (Palley,

[1] For an overview of the wage-led/profit-led literature, see e.g. Stockhammer (2011), Lavoie and Stockhammer (2012), Setterfield (2016).

1994; Dutt, 2006; Bhaduri, 2011; Hein, 2012; Stockhammer and Wildauer, 2016) can affect the nature and the stability of the demand regime.

So far, wealth and its distribution have not played a prominent role in the wage-/profit-led debate. However, apart from shaping economic capabilities, class positions, and political power, (productive) wealth also impacts aggregate demand since it entails profit income and thus co-determines the personal income distribution. Furthermore, wealth is distributed much more unequally than income. At the same time, the wealth distribution itself is influenced by the personal (and thus also the functional) income distribution, since wealth, apart from inheritances, is accumulated over time. Building on Pasinetti (1962), a small but growing literature extended Post-Keynesian models to include this cumulative dynamic (Dutt, 1990; Palley, 2012, 2017b; Taylor et al., 2015; Ederer and Rehm, 2019a, 2019b).

This burgeoning strand of Post-Keynesian models of wealth inequality has not yet investigated the consequences for wage-led or profit-led demand. The two notable exceptions are Dutt (1990) and Palley (2017b). However, whereas the former only discusses wage-led demand, the latter only focuses on the short run. The goal of this paper is to close this gap. It builds a Post-Keynesian model in the tradition of Bhaduri and Marglin (1990), which incorporates an endogenous wealth distribution, and discusses the short- and long-run implications for the demand regime.

In our model, a change in the functional income distribution does not only have immediate (short-run) effects on aggregate demand, but it also changes the distribution of wealth over time, which in turn has repercussions on both the distribution of income and on growth. The long-run effect of a rise in the profit share may thus differ from the short-run effect both quantitatively and qualitatively. In fact, we find that the wealth distribution plays a key role in determining whether an economy is wage- or profit-led in a Bhaduri-Marglin type model, and that it might lead to regime switching.

The contribution of the paper is threefold: First, we bring the recently developed Post-Keynesian wealth models (back) into the wage-/profit-led debate and discuss the implications of an endogenous wealth distribution for the demand regime. Second, we thereby provide a possible explanation for the difference between the short- and long-run effects discussed in the literature and for (endogenous) switches between wage-led and profit-led regimes. Third, we embed the discussion on the effects of the personal income distribution and financial variables on the demand regime in a Post-Keynesian endogenous wealth model.

The paper is structured as follows: Section 2 reviews the relevant literature. Section 3 describes the basic version of the model. Section 4 discusses the implications for wage-led/profit-led demand in the short- and long-run. Section 5 presents some extensions to the model and their consequences for the demand regime. Section 6 concludes.

2. Literature

In the decades following the seminal contribution of Bhaduri and Marglin (1990), an empirical literature developed which aimed at determining whether demand or growth regimes are wage- or profit-led. Many of these contributions find that small and open economies are profit-led, whereas larger, more closed economies or the world economy as a whole are wage-led (e.g. Stockhammer and Ederer, 2008; Stockhammer et al., 2009; Onaran and Galanis, 2014). Others find that aggregate demand is profit-led for the USA (Barbosa-Filho and Taylor, 2006; Carvalho and Rezai, 2016) and for a panel of 13 OECD countries (Kiefer and Rada, 2015).

Recently, the wage-led/profit-led debate has broadened into various directions. Three strands of this literature are relevant for our paper. First, some contributions question the stability of demand regimes (i.e. the supposition that they *always* remain wage-led or profit-led in any given economy). This literature emphasizes the possibility of regime changes. Bhaduri and Marglin (1990) already pointed out that the *degree* to which an economy is wage-led or profit-led depends on the level of the profit share itself, so that a rising profit share would make a profit-led regime ever less profit-led, and vice versa. Some recent contributions argue that the effect of a change in the profit share on consumption, investment and net exports materializes differently over time (Blecker, 2016; Setterfield and Kim, 2017) or includes nonlinearities which open up the possibility of a regime switch (Nikiforos and Foley, 2012; Palley, 2014a; Nikiforos, 2016). Some empirical contributions support the hypothesis that there are differences between the short- and the long-run effects of a change in the wage share (Stockhammer and Stehrer, 2011; Kiefer and Rada, 2015; Barrales and von Arnim, 2017).[2]

Second, another recent strand of the Post-Keynesian literature goes beyond the functional income distribution when looking into the wage-/profit-led nature of the demand regime. Some contributions soften the dichotomy between workers and capitalists and distinguish between three classes or allow for capitalists-managers to receive a certain part of wage income (Lavoie, 2009; Palley, 2014b). Others include the personal into the functional income distribution (Tavani and Vasudevan, 2014; Carvalho and Rezai, 2016; Palley, 2017a). Personal income inequality (typically understood as wage inequality) affects the degree to which an economy is wage- or profit-led, and opens up the possibility of regime switches through changes in its (usually exogenously given) distribution.

A third strand of the literature includes financial variables in the Bhaduri-Marglin model. The bulk of these contributions focuses on household and business debt and their redistributive and demand effects (Palley, 1994; Dutt, 2006; Hein, 2012). Some others, however, additionally include asset prices and often use them as a synonym for wealth, albeit without investigating their distribution (Bhaduri, 2011). Empirically, Stockhammer and Wildauer (2016) find that these financial variables impact aggregate demand.

From a different Post-Keynesian angle, a small but growing strand of the literature models wealth and the wealth distribution in an analytical setting, building on the insights of Pasinetti

[2] See Blecker (2016) for a discussion.

(1962). In particular, contributions by Dutt (1990), Palley (2012, 2017b), Taylor et al. (2015) and Ederer and Rehm (2019a, 2019b) include an endogenous wealth distribution into their models and discuss the existence and stability of a long-run equilibrium wealth share. In contrast to the standard Bhaduri and Marglin model and more in the spirit of Pasinetti (1962), these models explicitly distinguish between classes instead of functional income groups. They allow for workers to accumulate wealth and consequently receive profit income, and conversely, for capitalists to earn wage income. They therefore typically include a comprehensive personal income distribution. Ederer and Rehm (2019a, 2019b) furthermore differentiate the wealth compositions of workers and capitalists, which implies differential rates of return on their assets (Ederer et al., 2019).

The two contributions most relevant to this paper are Dutt (1990) and Palley (2017b). To the best of our knowledge, these are the only papers analyzing the implications of wealth distribution for the possibility of wage-/profit-led demand. The contribution by Dutt (1990), which precedes the wage-/profit-led debate following Bhaduri and Marglin (1990), discusses the consequences of the wealth distribution in a Kalecki-Steindl model which only allows for wage-led demand. It concludes that a rising profit share unambiguously reduces capacity utilization and increases the wealth concentration. Building on Dutt (1990), Palley (2017b) presents a model which allows for both wage- and profit-led demand and discusses the impact of a change in the wealth distribution on the demand regime. Palley concludes that an increase in the wealth share of workers increases the tendency of the economy to be profit-led because a redistribution from wages towards profits would harm consumption less. The discussion is, however, limited to the short-term effect and does not extend to the implications of the endogenous reaction of the wealth distribution to the shift in the profit share for the distribution of profit income and, consequently, for aggregate demand. This is the gap our paper intends to close.

This paper contributes to all four of these strands of the Post-Keynesian literature. First, we go beyond the functional and personal income distribution, by explicitly modelling the distribution of wealth. Second, this introduces a new explanation for the difference between short- and long-run effects, and an endogenous potential driver for regime switches. Third, we extend the small but promising literature on wealth inequality in Marglin-Bhaduri models by investigating the implications of an endogenous wealth distribution for the demand regime.

3. The Model

The model is a standard two-class, Post-Keynesian formulation in the tradition of Bhaduri and Marglin (1990). It makes the usual assumptions that growth is driven by aggregate demand, and that the profit share is determined by the mark-up of firms over unit labor costs. Drawing on Dutt (1990), Palley (2012, 2017b) and Taylor et al. (2015), and closely following Ederer and Rehm (2019a, 2019b), we introduce four novel aspects with respect to the original Bhaduri-Marglin model: (1) Workers save a certain part of their income; (2) they accumulate wealth

and are thus entitled to profit income; (3) wage income is split between workers and capitalists; and (4) workers and capitalists have different wealth compositions and thus different rates of return on their assets. We discuss the implications of the first two extensions in this section and turn to the last two in section 5.

3.1 Model definition

In the model, income *Y* is divided between total profits *R* and the wage bill *W* according to the (exogenous) functional income distribution π (the profit share).

$$R = \pi Y \tag{1}$$

$$W = (1 - \pi)Y \tag{2}$$

We follow Post-Keynesian convention by assuming a positive differential between the saving rates of capitalists s_r and workers s_w. In the standard Bhaduri-Marglin model, classes and income groups are treated synonymously since workers receive wages and capitalists get all the profit.[3] However, we follow Pasinetti (1962) in distinguishing between classes instead of income groups and allow for workers to save, so that they accumulate wealth and are consequently entitled to profit income.[4]

Income of workers (denoted by subscript *w*) and capitalists (subscript *r*) thus amount to

$$Y_r = zR \tag{3}$$

$$Y_w = W + (1 - z)R \tag{4}$$

in which *z* is the shares of capitalists of (productive) wealth, and *(1 – z)* share of workers:[5]

$$z = \frac{V_r}{V} \tag{5}$$

Both workers and capitalists save a fraction of their income, $S = s_w Y_w + s_r Y_r$. In order to de-trend income, profits, saving, and investment, we follow convention by normalizing them to the capital stock. This yields:

$$s = \frac{S}{K} = \{s_w[(1 - \pi) + (1 - z)\pi] + s_r z\pi\}u = [s_w + (s_r - s_w)\pi z]u \tag{6}$$

The investment equation is formulated according to the standard Post-Keynesian functional form in the Bhaduri-Marglin tradition, i.e. growth of the capital stock *K* depends on capacity utilization *u* and the profit share π. This allows for both wage- and profit-led demand regimes, depending on the values of the parameters β_1 and β_2 and the saving rates. It is therefore:

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[3] Since workers do not receive profits in the standard model, it either assumes that workers do not save, or (implicitly) that savings are out of to wage and profit *income*, but not related to classes (Hein, 2014).

[4] In line with the literature, we use the term 'personal income distribution' for the distribution of income between workers and capitalists.

[5] If $z = 1$, the model corresponds to the standard Bhaduri-Marglin model.

$$\frac{I}{K} = \beta_0 + \beta_1 u + \beta_2 \pi \tag{7}$$

Capacity utilization *u* and the growth rate of the capital stock *g* are:

$$u = \frac{Y}{K} \tag{8}$$

$$g = \frac{I}{K} \tag{9}$$

The only asset in the model is productive wealth *V* owned by households, which is equal to the capital stock *K*.

3.2 Short-run equilibrium

The short-run solution of the model assumes constant wealth shares. Capacity utilization adjusts instantaneously, so that the equilibrium in the aggregate goods market (i.e. the equality between investment and saving, or IS-condition) is fulfilled for any wealth share of capitalists. Solving for capacity utilization, we get:

$$u^* = \frac{\beta_0 + \beta_2 \pi}{s_w + (s_r - s_w)\pi z - \beta_1} \tag{10}$$

The short-run solution is thus similar to the standard Bhaduri-Marglin model.[6] However, capacity utilization now does not only depend on the parameters of the investment equation and the differential saving rates, but also on the wealth distribution. The latter affects the overall saving rate of the economy through its consequences for the personal income distribution and the differential saving rates of workers and capitalists.

As in the standard model, capacity utilization is either wage- or profit-led, depending on the value of the parameters. If saving increases more than investment following a rise of the profit share, then aggregate demand and capacity utilization decrease, so the economy is wage-led, and vice versa:

$$\frac{du^*}{d\pi} = \frac{\beta_2(s_w - \beta_1) - \beta_0(s_r - s_w)z}{(s_w + (s_r - s_w)\pi z - \beta_1)^2} \gtrless 0 \tag{11}$$

Two points are worth noting: First, as in the standard model, the degree to which capacity utilization is wage-led or profit-led depends on the level of the profit share (Bhaduri and Marglin, 1990). However, since π is not included in the numerator, the character of the demand regime (i.e. the sign of equation (11)) is not determined by it. Still, the higher the level of the profit share, the less profit-led is the demand regime, and vice versa. There are thus decreasing returns to policy-induced distributional changes on aggregate demand; i.e. the

[6] The denominator must be positive, which is referred to as the standard Keynesian stability condition in the Post-Keynesian literature. Note that in our model, this condition is weaker (albeit only marginally so), because $z \leq 1$.

effectiveness of policy-induced wage-/profit-led growth is limited (Nikiforos, 2016; Palley, 2014a).

Second, and crucially, a larger wealth share of capitalists makes capacity utilization less profit-led and more wage-led. Their larger wealth share translates into a larger share of profit income for capitalists. Because they also have a higher saving rate, this implies that redistributing from wages to profits raises savings more when the wealth share of capitalists is large. This larger leakage means less aggregate demand, that is, a contraction (or smaller expansion) following redistribution towards profit income. Similar to the profit share, a higher wealth share thus reduces the effectiveness of profit-led demand and can even sow the seeds for wage-led demand. Since the wealth share does affect the sign of the expression on the right-hand side of equation (11), a regime-switch is possible when *z* changes.

3.3 Long-run dynamics and equilibrium

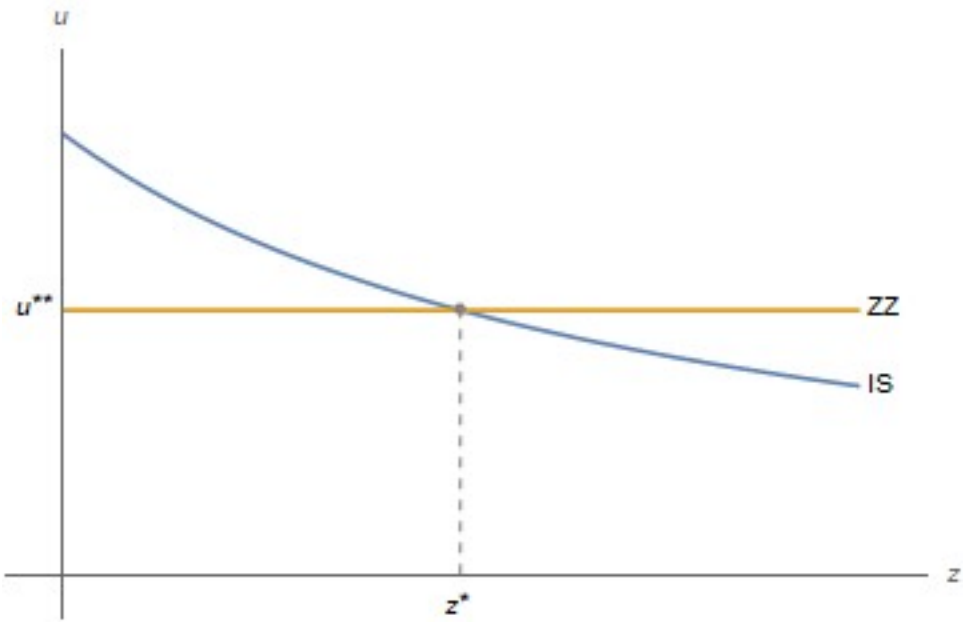
Over time, both capitalists and workers accumulate wealth so that the wealth share is no longer a constant, which changes short-run equilibrium capacity utilization (from Equation (10)). We define the IS curve as the loci of all short-run equilibria, depending on the level of the wealth share. Since we assume for simplicity that capacity utilization adjusts instantaneously, the economy is on the IS curve all the time.

In contrast to an increase in the profit share, which can either raise or reduce capacity utilization, an increase in the wealth share unambiguously depresses capacity utilization:

$$\frac{\partial u}{\partial z} = -\frac{(\beta_0 + \beta_2\pi)(s_r - s_w)\pi}{(s_w + (s_r - s_w)\pi z - \beta_1)^2} < 0 \qquad (12)$$

The reason is that saving rises when wealth inequality increases, and there is no counterbalancing effect of wealth inequality on investment. The latter is only determined by the profitability of firms (and thus the profit share), not by the ownership structure or the distribution of profits between workers and capitalists. Graphically, Figure 1 shows that the IS curve is positive for $0 \leq z \leq 1$, concave, and downward sloping in the *z*-*u*-plane.

Figure 1: Long-run equilibrium



Source: own elaboration

In order to find the long-run equilibrium wealth share, we take the derivative of *z* with respect to time and rewrite the differential equation (recall that $z = V_r/V$):

$$\dot{z} = \frac{\dot{V}_r V - V_r \dot{V}}{V^2} = \frac{\dot{V}_r}{V} - \frac{\dot{V}}{V}\frac{V_r}{V} = \frac{s_r Y_r}{V} - gz \tag{13}$$

The economic intuition behind Equation (13) is the same as in Pasinetti's (1962) Cambridge equation $s_r r = g$: The wealth share is stable when capitalists save exactly the amount that corresponds to their share in the increase in total wealth.[7]

Substituting equations (3) and (7) into equation (13) gives us a dynamic equation for the wealth share:

$$\dot{z} = s_r z \pi u - (\beta_0 + \beta_1 u + \beta_2 \pi) z \tag{14}$$

Following Dutt (1990), we define the ZZ curve as the loci of all combinations of *u* and *z* for which the wealth share is stable ($\dot{z} = 0$):

$$\bar{u} = \frac{(\beta_0 + \beta_2 \pi)}{s_r \pi - \beta_1} \tag{15}$$

Since it is independent of the wealth share, the ZZ curve is a horizontal line with positive values for $\bar{u}$ as long as $s_r \pi > \beta_1$, as shown in Figure 1. There is only one level of capacity utilization for which the wealth share is stable.

[7] Consequently, Palley (2017b) points out that the Cambridge equation should be interpreted as an 'ownership equilibrium condition', since capitalists must save just enough to maintain their ownership share.

Above the ZZ curve, *z* increases and *u* decreases, so that the curve acts as an attractor, i.e. the economy returns to the curve following perturbations.[8] Since the economy is by assumption always on the IS curve, the intersection of the two curves is thus the long-run equilibrium. That is, both the IS condition and the condition for a stable wealth share represented by the ZZ curve are satisfied in the long-run. The equilibrium is obtained by setting $\dot{z} = 0$ and solving for z:

$$z^* = \frac{s_r\pi - s_w}{(s_r - s_w)\pi} \tag{16}$$

The (long-run) distribution of wealth thus only depends on the differential saving rates and the profit share. Capitalists' long-run equilibrium wealth share *z** is higher: (1) the higher the profit share, (2) the higher the saving rate of capitalists, and (3) the lower the saving rate of workers. The equilibrium is unique and stable at positive values for *u* and *z*, as long as the differential in saving rates is large enough (i.e., $s_r\pi > s_w$).

Equation (16) shows that the two curves always intersect at a value of $z < 1$. In the long-run equilibrium, workers therefore also hold a certain share of wealth. There are two corner solutions for the wealth share: First, if workers do not save at all, all wealth will be concentrated in the hand of capitalists ($z = 1$). Second, if capitalists do not save, all wealth will eventually belong to workers ($z = 0$). Furthermore, if the two saving rates are equal ($s_w = s_r$), the model has no meaningful solution for *z*. If capitalists have no access to wage income, then all wealth is again concentrated in the hand of workers.[9]

4. The demand regime in the short- and the long run

Next, we investigate the short- and long-run effects of a shift in the profit share. In the short run, capacity utilization can be wage- or profit-led, depending on the level of the wealth share (as well as on the values of the other parameters): a higher *z* raises the tendency for the economy to be wage-led, as discussed above. This can also be shown graphically: a higher profit share increases the intercept of the IS curve at the *u*-axis. Furthermore, it increases the concavity of the curve, so that its slope becomes steeper for low values of *z* and flatter for high values of *z*. The new IS curve (for a higher profit share π_2) eventually crosses the old one from above at a threshold $\bar{z}$. For $z < \bar{z}$, capacity utilization is profit-led, and for $z > \bar{z}$, it is wage-led (Figure 2):[10]

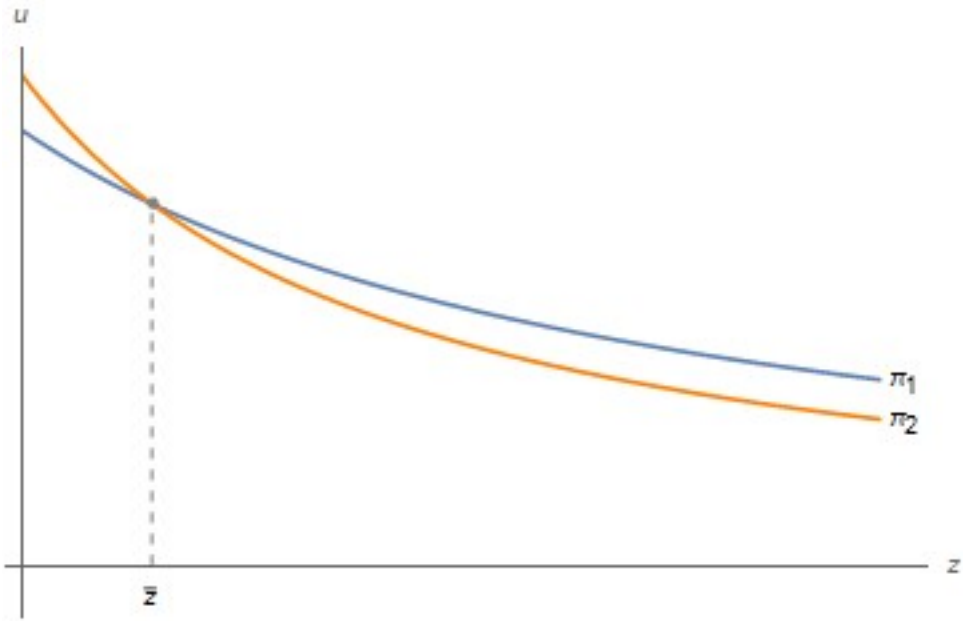
$$\bar{z} = \frac{\beta_2(s_w - \beta_1)}{\beta_0(s_r - s_w)} \tag{17}$$

[8] Ederer and Rehm (2019a, b) provide a detailed stability analysis of the dynamics of the wealth share, without investigating its impact on the demand regime.

[9] See Meade (1964) and Taylor (2014) for a discussion.

[10] The threshold $\bar{z}$ can be greater than one, in which case the demand regime is profit-led for all values of *z* with $0 \leq z \leq 1$. If $s_w > \beta_1$, then $\bar{z} > 0$. In that case, the demand regime is profit-led for at least some values of *z*. In the opposite case, i.e. when $\bar{z} < 0$, the demand regime is wage-led for $0 \leq z \leq 1$.

Figure 2: IS curve



Source: own elaboration.

So far, we have only considered the shift in the IS curve due to an increase in the profit share. This shift represents the short-run effect, for which (by assumption) the wealth share remains constant. In our model, however, the wealth share does not only co-determine whether an economy is wage- or profit-led in the short-run, but it also adjusts endogenously over time until it reaches its new long-run equilibrium determined by the new parameter values (including the profit share). The long-run equilibrium is on the ZZ curve, which unambiguously shifts downward following a rise of the profit share:

$$\frac{d\bar{u}}{d\pi} = -\frac{\beta_0 s_r + \beta_1 \beta_2}{(s_r \pi - \beta_1)^2} < 0 \qquad (18)$$

The new equilibrium is thus at the intersection of the new IS and ZZ curve. However, the effects of an increase in the profit share on the wealth share and capacity utilization depends on whether the original equilibrium is on the profit-led or wage-led segment of the IS curve. We thus distinguish between two cases:

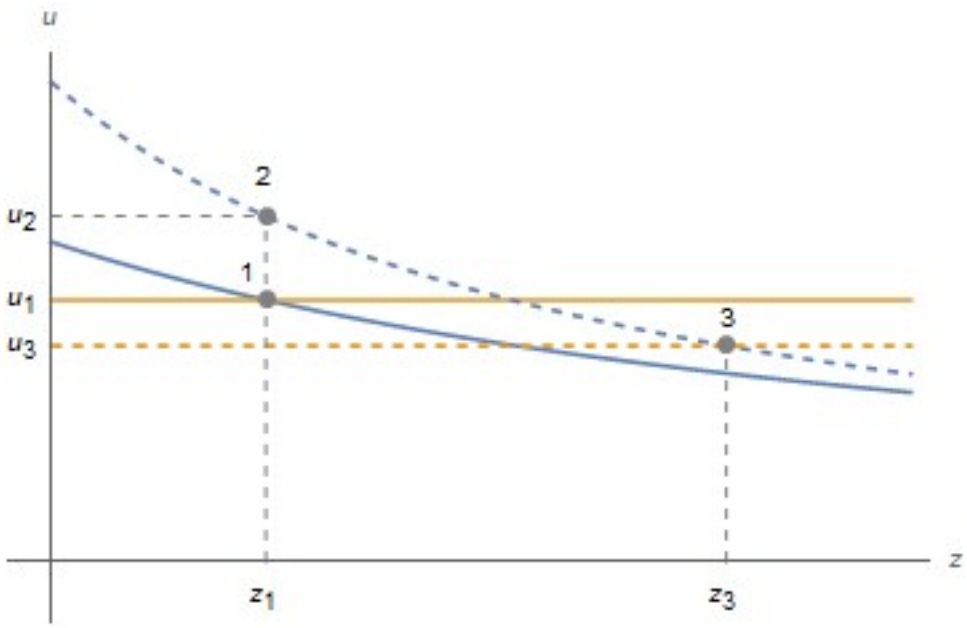
(1) Profit-led:

The IS curve shifts upwards following an increase in the profit share (see Figure 3). Since the wealth share remains constant in the short-run, capacity utilization increases (from (1) to (2) in Figure 3), which corresponds to the profit-led effect of the standard model. However, the increase in the profit share shifts the ZZ curve down. Due to the endogenous dynamic described in Equation (14), the wealth share increases, so that the economy moves along the IS curve and capacity utilization decreases until it reaches its new equilibrium (Point (3)). Since

the new ZZ curve is below the old one, the new long-term equilibrium is at a higher wealth share of capitalists and a lower level of capacity utilization compared to the original situation.

The long-term demand regime is thus wage-led, even though it is profit-led in the short term. There is an endogenous regime switch in the sense that the effect of a redistribution towards profits changes from profit-led to wage-led demand over time, which is due to the endogenously increasing wealth share following a redistribution towards profit income.

Figure 3: Profit-led case



Source: own elaboration.

2) Wage-led:

In the wage-led segment, the IS curve shifts down when the profit share rises. With a constant wealth share, capacity utilization decreases (as in the standard model): the economy moves from (1) to (2) in Figure 4. As in the profit-led case, the endogenous wealth dynamic of the model subsequently takes the wealth share and capacity utilization to its new long-term equilibrium (Point (3) in Figure 4).

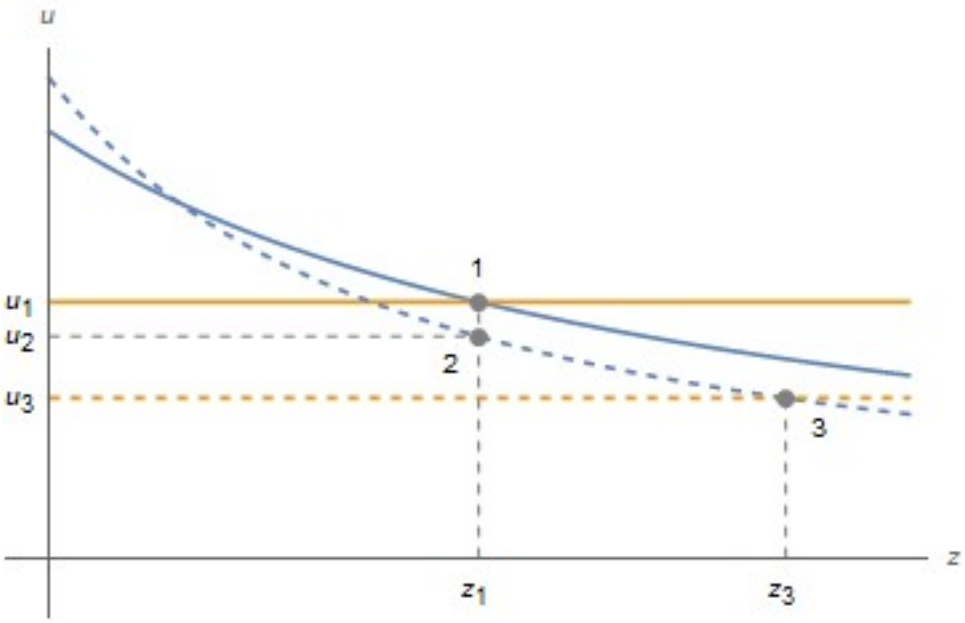
Since both curves shift down, the long-run effect on wealth inequality could in theory be ambiguous. Depending on whether the ZZ curve is more or less sensitive to an increase in the profit share than the IS curve, the new long-term equilibrium wealth share is higher or lower than the original one.

However, Equations (11) and (18) show that the downward shift of the ZZ curve is always bigger than that of the IS curve, so that the wealth share unambiguously rises:[11]

$$\frac{dz^{**}}{d\pi} = \frac{s_w}{(s_r - s_w)\pi^2} > 0 \tag{19}$$

Capacity utilization unambiguously decreases, so that the economy is wage-led in the long-run; there is no regime switch. However, since the wealth share rises over time, capacity utilization decreases even further in the long run, so that the short-term wage-led effect is strengthened. Thus, regardless of whether the economy is wage-led or profit-led in the short-run, in the long-run it is always wage-led when we take the (endogenously determined) wealth distribution into account.[12]

Figure 4: Wage-led case



Source: own elaboration.

[11] Another way to show that is to look at the dynamic equation for the wealth share: Since capitalists' savings (the first term in Equation (13)) react more strongly to a rise in the profit share than their share in total savings (the second term), the wealth share must rise.

[12] Note that the long-run equilibrium value for capacity utilization is given by Equation (15). Since it decreases when the profit share rises, the economy is unambiguously wage-led in the long-run.

5. Extensions

5.1 Model

This section extends the basic version presented in the previous section. First, capitalists receive a certain part of wage income, and second, workers and capitalists have different wealth compositions and thus different rates of return on their assets.

Both extensions are very well-grounded in the literature. Regarding capitalists' wage income, several contributions relax the theoretical dichotomy between workers and capitalists or include the personal income distribution into their models (Palley 2014b, Carvalho and Rezai, 2016). Empirically, capitalists receive between 5 and 10% of wages in most Euro-area countries (Ederer and Rehm, 2019a). We thus assume a certain share of wages to go to capitalists, given by an exogenous parameter α.

Regarding differential rates of return between workers and capitalists, the Post-Keynesian literature extensively discusses their effects on growth regimes (Kahn, 1959; Laing, 1969; Harcourt, 1972; Pasinetti, 1974, 1983). Possible reasons for differential returns are a more professional wealth management, the ability to take higher risk, a higher likelihood of insider knowledge, and differences in the composition of wealth of workers and capitalists (Ederer and Rehm 2019a). Empirically, the differential in returns amounts to roughly 1.5 percentage points (Ederer et al., 2019), due to workers holding a larger share of their (productive) wealth in low-yield assets, in particular deposits, compared to capitalists. Capitalists thus receive a higher share of profits and benefit more from the compound interest effect. We extend the model by distinguishing between two asset types: deposits, which for simplicity we assume to be non-interest bearing, and profit-generating assets, which yield profit income. Workers and capitalists hold different shares of their wealth in profit-generating assets (γ_w, γ_r).

Income of workers (denoted by subscript *w*) and capitalists (subscript *r*) thus amount to

$$Y_w = (1-\alpha)W + \frac{\gamma_w(1-z)}{\gamma_w(1-z)+\gamma_r z}R \tag{20}$$

$$Y_r = \alpha W + \frac{\gamma_r z}{\gamma_w(1-z)+\gamma_r z}R \tag{21}$$

in which *(1 – z)* and *z* are the shares of workers and capitalists of (productive) wealth. The IS curve then becomes:

$$u^* = \frac{\beta_0 + \beta_2\pi}{s-\beta_1} \tag{22}$$

$$\begin{aligned} s = \; & s_w\left[(1-\alpha)(1-\pi) + \frac{\gamma_w(1-z)}{\gamma_w(1-z)+\gamma_r z}\pi\right] \\ & + s_r\left[\alpha(1-\pi) + \frac{\gamma_r z}{\gamma_w(1-z)+\gamma_r z}\pi\right] \end{aligned} \tag{23}$$

Equations (22) and (23) show that the qualitative features of the IS curve are the same as in the basic model. The intercept on the *u*-axis is positive and capacity utilization decreases when the wealth share rises. The curve is concave and asymptotically approaches a positive value as *z* approaches infinity.

The total saving rate now depends on the share of wage income which accrues to capitalists (α) and the share of profit-generating wealth of workers (γ_w) and capitalists (γ_r). A higher α increases the saving rate, because capitalists receive a larger share of wage income. It thus shifts the IS curve downward unambiguously, since the increase in the saving rate reduces capacity utilization. Higher γ_w and γ_r reduce and raise the saving rate, respectively, following a redistribution of profit income from workers to capitalists.[13] A higher differential in the rates of return (i.e. a larger difference between γ_r and γ_w) thus shifts the IS curve downward.

Capacity utilization is still wage-led or profit-led in the short-run as in the basic model, depending on the value of the parameters and the level of the wealth share *z*. However, α, γ_w, and γ_r now also affect the demand regime. A higher capitalists' share in wage income increases the tendency of capacity utilization to be profit-led. The higher α, the smaller is the effect of a redistribution between wages and profits on total savings, since capitalists' saving rate for wage and profit income is the same. Thus, the positive effect of a higher profit share on investment is more likely to dominate the negative impact on consumption. Capitalists' share of wage income affects the sign of the demand regime: an increase in α may switch demand from wage-led to profit-led for certain values of *z*. This result is in line with Palley (2014b) and Carvalho and Rezai (2016).

Furthermore, a higher rates of return differential increases the tendency for the economy to be wage-led. A higher share of productive wealth in total wealth of capitalists (or a lower share in workers' wealth) increases the effect of a redistribution from wages to profits on savings, because it increases (decreases) the share of profits going to capitalists. It is thus more likely that the effect on savings and consumption dominates the opposite effect on investment (which remains unchanged).

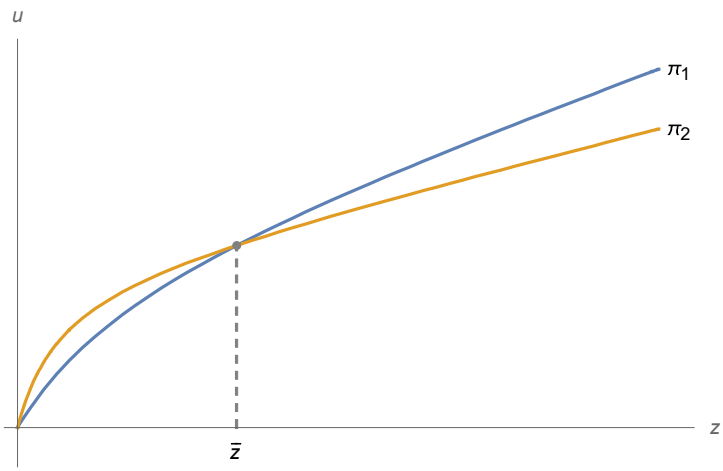
The ZZ curve now amounts to:

$$\bar{u} = \frac{(\beta_0 + \beta_2 \pi) z}{s_r \left[\alpha(1-\pi) + \frac{\gamma_r z}{\gamma_w + (\gamma_r - \gamma_w) z} \pi \right] - \beta_1 z} \tag{24}$$

[13] This is only true for $0 < z < 1$. At $z = 0$ and $z = 1$, the saving rate is independent from the wealth compositions since the entire profit income goes to workers and capitalists, respectively.

The main difference to the basic model is that the ZZ curve is not horizontal any more. It passes through the origin[14] and increases with *z*, as shown in Figure 5.[15] The curve is convex and thus steeper for small values of *z* and flatter for high values of *z*.

Figure 5: ZZ curve in the extended model



Source: own elaboration

The distribution of wage income and the wealth compositions now also affect the ZZ curve. A higher α shifts the ZZ curve downward because it increases capitalists' savings. For each value of *z*, a lower capacity utilization is required to maintain the wealth share stable. Its concavity decreases, so that the slope becomes flatter for lower levels of *z* and the difference between the steeper and the flatter segment of the curve is less pronounced. Consequently, the range of values of the wealth share for which the curve is steep is larger. For small values of α, the concavity of the curve becomes very pronounced and the steep part at low wealth shares is limited to a small range of *z*.[16]

A higher difference in the wealth compositions shifts the curve downward for $0 < z < 1$, because it increases the share of profits going to capitalists, and thus their savings. Furthermore, it reduces the concavity of the curve, so that it becomes flatter for small values of z and steeper for high values of *z*. The slope of the flatter part (for higher values of *z*) positively depends on the difference between the wealth compositions.

The long-term equilibrium of the extended model is thus at a lower capacity utilization and at a higher wealth share than in the basic model. Distributing a certain share of wages to

[14] Since capitalists also save out of wage income, the only way to force their savings to zero (so that they correspond to the growth of their share in total wealth, which is also zero), is with zero capacity utilization.

[15] For a higher wealth share, capacity utilization must increase to raise capitalists' saving so that it corresponds to the increase in their (higher) share of total wealth growth.

[16] For $\alpha = 0$, the ZZ curve fades into an (almost) linear curve (although with a positive intercept).

capitalists and incorporating differential rates of return shift the wealth distribution in capitalists' favor, and consequently depress capacity utilization.

Furthermore, the extensions have implications for the effects of a shift of the profit share on the ZZ curve. It is now, in contrast to the basic model, not unambiguously downward-shifting any more. For small values of *z*, it tends to shift upwards and for large values of *z* downwards, because its concavity increases due to a higher profit share. As with the IS curve, there is a certain threshold $\bar{\bar{z}}$ for which the ZZ curve shifts upward when the profit share rises if $z < \bar{\bar{z}}$, and shifts downward if $z > \bar{\bar{z}}$. The reason is that a higher profit share has a smaller effect on capitalists' savings for low wealth shares, because their share in profit income depends on the level of *z*.

The distribution of wage income and differential rates of return also have an impact on the reaction of the ZZ curve to a shift in the profit share. The larger the value of α, the higher is the threshold $\bar{\bar{z}}$, because wage income plays a larger role for capitalists' income. For small values of α, the threshold may vanish, and the ZZ curve shifts downward unambiguously for $z > 0$. Likewise, a higher γ_w increases the threshold, while γ_r reduces it. The higher the rates of return differential, the more likely is the ZZ curve to shift downward for a certain value of *z*.

We can thus summarize the discussion by distinguishing between two segments of the ZZ curve: (1) For small values of *z*, its slope is steep, and the curve shifts upwards when the profit share rises. (2) For larger values, the slope is flat (with its actual slope depending on the difference between the wealth compositions) and the curve shifts downward following an increase in the profit share. The threshold between the two segments of the curve depends on the value of the parameters and may even vanish, so that the curve shifts downward for all *z* (and its slope is rather flat). The smaller the capitalists' share in wage income and the higher the rates of return differential, the narrower is the first segment of the ZZ curve.

5.2 Wage-led vs. profit-led in the extended model

To investigate the effects of a rise in the profit share on the short- and long-term equilibrium, we distinguish between various cases. First, the IS curve can shift upwards or downwards, according to whether the economy is wage-led or profit-led in the short run. Second, the ZZ curve can possibly shift upwards or downwards (or rather, both curves can have an upward- and downward-shifting segment, as discussed above). Third, the ZZ curve is an increasing function of the wealth share and can possibly have a steep and/or flat slope.

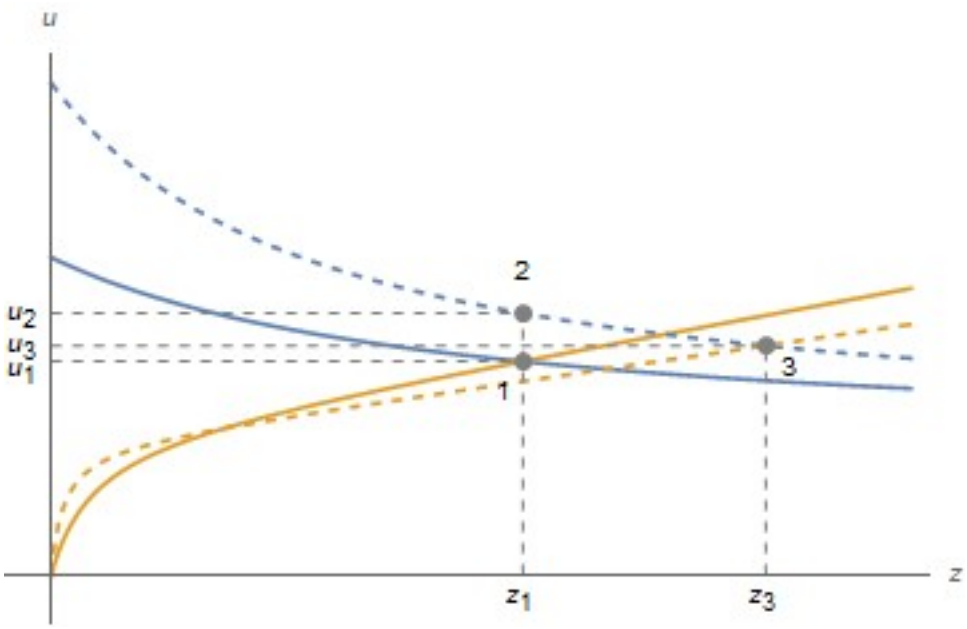
It is more likely that the long-run equilibrium is in a steep and upward-shifting segment of the ZZ curve, the lower the level of the wealth share (as it increases the likelihood that it corresponds to a profit-led IS curve). However, for the (rather small) values of α usually observed empirically, the zone in which the two both curves exhibit such a behavior becomes narrow. We thus abstract from this case and limit our discussion to the case when the IS curve intersects with the flat and downward-shifting part of the ZZ curve and distinguish between a

profit-led and a wage-led IS curve (in the short run). The main difference to the basic model is then that the ZZ curve is now upward-sloping instead of horizontal.

a) Profit-led:

In the profit-led case, the IS curve shifts upward due to a rise in the profit share. In the short run, capacity utilization increases (from (1) to (2) in Figure 6). Since the ZZ curve shifts downward, the economy is no longer in the long-term equilibrium. The wealth share thus increases, and capacity utilization falls, when the economy moves along the IS curve, until it reaches the new long-run equilibrium (from (2) to (3)). Interestingly, since the ZZ curve is now upward-sloping, capacity utilization can be higher or lower than before the increase in the profit share. In the long-run, the economy can thus be either wage- or profit-led, in contrast to the basic model. If the shift of the ZZ curve is large (relative to the shift of the IS curve) and/or the slope of the ZZ curve is flat (or the slope of the IS curve is steep), the economy ends up at a lower capacity utilization, and the long-run demand effect is wage-led. In the opposite case, it is still profit-led, although the (positive) long-term demand effect of the rising profit share is smaller than the short-term effect because the rising wealth share reduces capacity utilization (ceteris paribus).

Figure 6: Profit-led case in the extended model



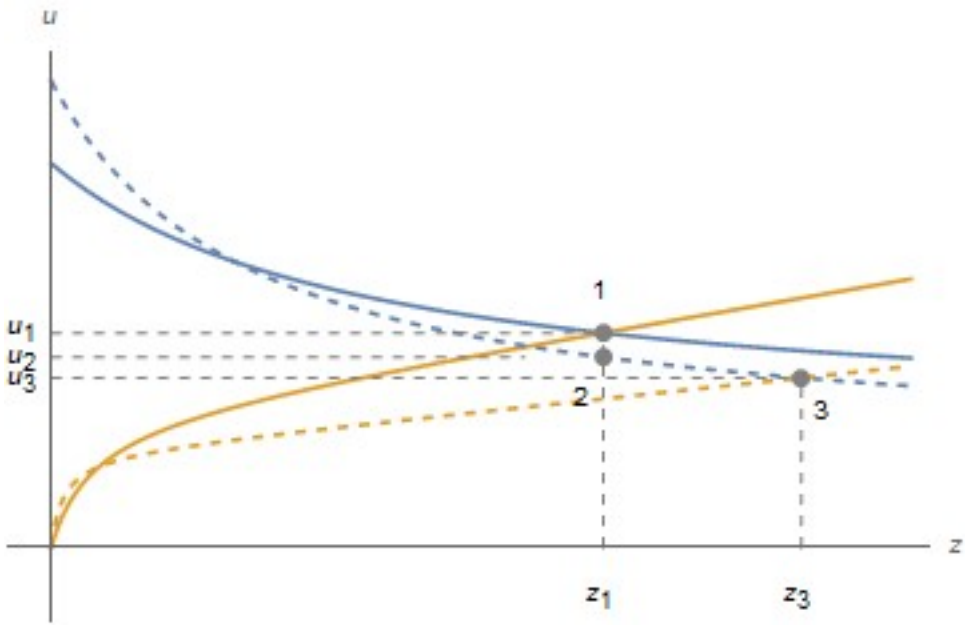
Source: Own elaboration.

b) Wage-led:

If the IS curve shifts downward when the profit share rises, then capacity utilization is wage-led in the short-run. The economy moves from (1) to (2) in Figure 7. Since the ZZ curve also shifts downward, the new long-run equilibrium is at a lower level of capacity utilization. As

with the basic model, the ZZ curve may shift either more or less than the IS curve, with similar implications for capacity utilization and the wealth share. However, as before, capitalists' savings are more sensitive to a change in the profit share than their share in total savings, so that the wealth share increases, and capacity utilization decreases further. In the long run, the (short-run) wage-led effect is reinforced by the rise in the wealth share. The difference between the long-run and short-run effect, however, is less pronounced than in the basic model since the ZZ curve is now upwards sloping.

Figure 7: Wage-led case in the extended model



Source: Own elaboration.

6. Conclusion

The paper investigates whether the distribution of wealth affects the demand effects of a shift in the functional income distribution. We construct a Post-Keynesian model in the tradition of Bhaduri and Marglin (1990) and include an endogenous wealth distribution, as well as the distribution of wage income and different wealth compositions between workers and capitalists. We find that whether capacity utilization responds positively (profit-led) or negatively (wage-led) to a redistribution towards profits depends on the wealth share: the higher the concentration of wealth in the hands of capitalists, the lower is aggregate demand and capacity utilization.

Furthermore, the distribution of wealth adjusts endogenously to a shift in the functional income distribution in the long run. With a rising profit share, capitalists' wealth share increases, because their savings react more strongly than workers'. In other words, a higher

wealth share of capitalists implies a higher saving rate, and as a consequence, capacity utilization declines.

Depending on whether the economy is wage-led or profit-led in the short-run, there are a number of possible cases: In the profit-led case, the short-run effect of a rise in the profit share on capacity utilization is positive. Following the endogenous increase of the wealth share, capacity utilization falls, so that the long-run effect is smaller than the short-run effect, and there is the possibility of a regime switch. In that case, the short-run profit-led economy becomes wage-led in the long run due to the endogenous effects of wealth inequality.

In the wage-led case, the short-run effect of a redistribution towards profits on aggregate demand is negative. In the long run, this effect is intensified, so that capacity utilization falls further. The (negative) long-run effect is thus larger than the short-run effect.

This finding has clear policy implications: Even when the demand regime in an economy is profit-led in the short run (i.e., an increase in the profit share stimulates demand), this effect is dampened by the rising wealth concentration and might even become negative over time. If demand, on the other hand, is wage-led, the short-term effect is strengthened by a rising wealth concentration, so that the long-term negative effect on capacity utilization is higher. Incorporating wealth inequality into the analysis thus makes a trade-off between more equality in the functional income distribution and growth less likely.

Since this is, to the best of our knowledge, the first attempt of incorporating an endogenous wealth distribution into a demand regime framework, many questions remain open. First and foremost, this paper does not empirically estimate different countries' demand regimes for reasons of space. Doing so, while incorporating this analytical perspective on wealth inequality, would be the obvious next step. Furthermore, relaxing the assumption that firms' investments are undertaken separately from capitalists' saving and consumption decisions might lead to interesting dynamics. Finally, it might be interesting to extend the model further to incorporate other aspects that the literature has shown to potentially lead to regime switches (such as nonlinearities or changing effects on consumption, investment and net exports over time) and investigate their interactions.

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