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Autonomous demand and the Marglin–Bhaduri model: a critical note

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Within post-Keynesian macroeconomic theory, the contribution by Marglin and Bhaduri (Bhaduri and Marglin 1990; Marglin and Bhaduri 1990) on the relationship between income distribution and growth has progressively asserted itself as a benchmark model, a reference point that has originated and still gives rise to plenty of theoretical and empirical works. Given this popularity, in the related literature it is often claimed that the only open question left is an empirical one: to assess econometrically whether a particular economy is wage- or profit-led. In this essay, I will argue that some theoretical issues, related to this model and to the literature inspired by it, can nonetheless be raised. In particular, the treatment of investment appears to be the least convincing aspect of the approach à la Marglin–Bhaduri. More specifically, it seems possible to raise some doubts about an independent long-run influence of the profit rate or of the profit share on investment, an influence that is not in general justified or explained in detail by this literature and that to some extent is simply taken for granted. It will be shown that, if the Marglin–Bhaduri model is integrated with an explicit consideration of the autonomous components of demand, income distribution does not exert any permanent influence on the rate of growth of the economy and on the rate of accumulation. Matching this result with the usual assumption, made in post-Keynesian models of growth and distribution, that capacity utilization is the adjusting variable in equilibrating investment and savings leads to paradoxical results that question the plausibility of an accumulation function like the one used in the Marglin–Bhaduri model.

Keywords: *income distribution, investment function, growth, Marglin–Bhaduri*

JEL codes: *B51, E11, E12, O41*

1 INTRODUCTION

It seems fair to claim that the post-Keynesian approach to economics, with its multifaceted declinations,[1] has established itself as the most consistent and organic alternative to the dominant neoclassical paradigm. Within post-Keynesian macroeconomic theory, the Marglin–Bhaduri contribution (Bhaduri and Marglin 1990; Marglin and Bhaduri 1990) on the relationship between income distribution and growth has progressively asserted itself as a benchmark model, a reference point that has originated and still gives rise to plenty of theoretical and empirical works, extensions and applications.[2]

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1. See Lavoie (2011).

2. Lavoie and Stockhammer (2012, p. 10) refer to it as '*The* post-Kaleckian model of growth and distribution' (emphasis added). Other relevant contributions to this literature can be found in

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In this essay, I will point out some critical aspects of the Marglin–Bhaduri model that I find both in the original formulation and in the most recent literature inspired by it.

In its original and more general version (Marglin and Bhaduri 1990), the model is constituted by a consumption function that positively depends on the degree of capacity utilization and negatively on the profit share[3] and by an accumulation function, positively related with the degree of capacity utilization and the profit share. A net exports function, which depends negatively on both capacity utilization and the wage share, is added in the open-economy extensions (see for example Bhaduri and Marglin 1990). Within this framework, the overall effect on aggregate demand and growth of a shift in functional income distribution depends on the parameters of the model, in particular the relative sensitivity of the components of demand to the profit share and to the degree of capacity utilization.

The literature inspired by the Marglin–Bhaduri model often claims that the only open question left is an empirical one: to assess econometrically whether a particular economy is wage- or profit-led. Nonetheless, several authors – among them some Sraffian scholars – have highlighted problematic aspects. Cavalieri et al. (2004) challenge the idea that the interests of workers and employers, in terms of income distribution, can coincide in a capitalist economy – contrary to what Marglin and Bhaduri maintain[4] – once the actual profit rate is carefully distinguished from the normal profit rate. This leads to the renewed attention paid to the abandonment of the concept of normal utilization, in the more general neo-Kaleckian growth model[5] and in its Marglin–Bhaduri specification, and to the unsatisfactory nature of the solutions proposed by those models to avoid Harrodian instability (for example, Cesaratto 2015). Petri (1994, p. 149) and Serrano (2004, p. 14) criticize the supposed influence of the profit share or profit rate on the investment function: if, independently from the actual profit rate or even in the case of a reduction of it, capitalists do not take the opportunity given by an expansion of demand, they will simply observe a reduction in their market share, in favor of competitors willing to satisfy the demand coming from the customers able to pay the normal prices.[6]

Bowles and Boyer (1995), Blecker (2002), Hein and Vogel (2008), Stockhammer et al. (2009), Hein and Tarassow (2010), Onaran et al. (2011), Stockhammer et al. (2011), Hein (2012), and Onaran and Galanis (2012) – the last-named, along with Lavoie and Stockhammer (2012), being part of an ILO research project recently collected in a book and published as Lavoie and Stockhammer (2014).

3. The marginal propensity to consume of workers is assumed to be higher than the propensity to consume out of profits.

4. The alignment of capitalists' and workers' interest is the characteristic of a cooperative regime, as defined in Marglin and Bhaduri (1990, p. 171).

5. With this last term, I refer to a series of models of growth and distribution whose first examples can be traced back to Rowthorn (1981) and Amadeo (1986). The Marglin–Bhaduri model can be attributed to this theoretical tradition. Its main novelty is represented by the accumulation function (see equation (3) below), introduced because of the authors' dissatisfaction with the supposed rigidity of standard Keynesian theory, according to which higher wages always increase demand. Indeed, 'we view the Keynesian insistence on aggregate demand as an important ingredient to understand how modern capitalism works, but the stagnationist model as very much bound to particular places and times' (Marglin and Bhaduri 1990, p. 155). Through the introduction of the profit share in the accumulation function, the authors' objective was to provide a more flexible theoretical framework, able to produce different demand and growth regimes.

6. As Petri (1994, p. 149) argues, 'whatever the rate of profit, investment will only be effected if it promises greater profits than if not effected, i.e. if changes in aggregate demand or technical progress justify it.'.

In this essay, I will try to provide further arguments against the Marglin–Bhaduri investment function, by means of a simple and 'innocent' exercise. The original model neglects the existence of components of demand other than investment and induced consumption.[7] I will include these components (for example exports and public expenditure) in the picture, in order to stress some theoretical weaknesses implicit in the Marglin–Bhaduri treatment of investment. More specifically, it seems possible to cast some doubts about an independent long-run influence of the profit rate or the profit share on investment. This influence is, in general, neither justified nor explained in detail in the relevant literature and to some extent is simply taken for granted,[8] making a generic reference to the actual profit share as an indicator of expected profitability and to profits as a necessary source of internal funds. In this respect, it will be shown that, once the original model is integrated with an explicit consideration of autonomous demand, income distribution does not exert any permanent influence on the rate of growth of the economy and on the rate of accumulation. Once this result is matched with the usual assumption made in post-Keynesian and neo-Kaleckian models of growth and distribution that the degree of capacity utilization is the adjusting variable in equilibrating investment and savings, we obtain paradoxical results that question the plausibility of an accumulation function like the one used in the discussed literature. In addition, the famous taxonomy introduced by the authors (stagnationist vs exhilarationist demand regimes; wage-led vs profit-led growth regimes, see Marglin and Bhaduri 1990) is proved to be problematic as well.

The essay proceeds as follows: in Section 2, a baseline version of the Marglin–Bhaduri model is presented; in Section 3, I introduce the autonomous components of demand into the model. This inclusion leads to paradoxical results, on the basis of which I will cast some doubts about the investment function of the Marglin–Bhaduri model and the main findings of the entire approach. Section 4 summarizes the main results of the essay and draws some conclusions.

2 A BASELINE VERSION OF THE MODEL

In the original formulation of the model (Marglin and Bhaduri 1990), aggregate demand is modeled according to the following three equations:

$$r \equiv \frac{P}{K} \equiv \frac{P}{Y}\frac{Y}{Y^n}\frac{Y^n}{K} \equiv \Pi\frac{u}{v} \tag{1}$$

$$g^s = \frac{S}{K} = sr = s\Pi\frac{u}{v} \tag{2}$$

$$g^K = \frac{I}{K} = f(r^e(\Pi, u)), \tag{3}$$

7. On the other hand, in Bhaduri and Marglin (1990) the open economic scenario is discussed as well and exports are introduced into the analysis, but in a temporal framework limited to the short run, which leaves no room for the capacity-generating effects of investment.

8. A similar point is raised in Petri (1994, p. 149), where the author also notices that Marglin and Bhaduri make reference, to provide a theoretical justification to their accumulation function, to authors like Jorgenson, Tobin, and Malinvaud (Marglin and Bhaduri 1990, p. 160), whose investment theories are quite different and hardly compatible among them.

where the first one is simply an accounting identity representing the rate of profit r as the product of the profit share Π, the rate of capacity utilization u and the inverse of the normal capital-output technical coefficient v. The second is the saving function, with the implicit assumption that only capitalists save (s represents their marginal propensity to save). The third is the accumulation function. The rate of accumulation is assumed to be a positive function of the expected rate of profit ($\frac{df}{dr^e} > 0$), which in turn is positively affected by the profit share and the capacity utilization ($\frac{\partial r^e}{\partial \Pi} > 0$ and $\frac{\partial r^e}{\partial u} > 0$). As Marglin and Bhaduri (1990, p. 163) explain: 'the first because the unit return goes up, the second because the likelihood of selling extra units of output increases.' In their attempt to explain the slowdown in growth in many western economies during the 1970s through the concept of *profit squeeze*, the authors justify the influence of the profit share on the accumulation rate also by regarding profits as 'an important source of saving, so the reduction of profits made less income available for accumulation' (ibid., pp. 152–153). Incidentally, the last argument completely reverses the causality between savings and investment with respect to the standard Keynesian and post-Keynesian view[9] and it is hardly consistent with claims like 'the pace of accumulation is determined by firms' decision to invest, independent of savings' (Hein 2012, p. 46), often made in the recent literature that develops the same theoretical framework and uses the same functions as Marglin and Bhaduri (1990).

The goods market equilibrium condition $g^S = g^K$ completes the model. From equations (2) and (3), we obtain:

$$s\Pi\frac{u}{v} = f(r^{\mathrm{e}}(\Pi, u)). \tag{4}$$

Totally differentiating, we get $\left(s\frac{u}{v} - \frac{df}{dr^e}\frac{\partial r^e}{\partial \Pi}\right)d\Pi - \left(\frac{df}{dr^e}\frac{\partial r^e}{\partial u} - s\frac{\Pi}{v}\right)du = 0$, from which we can derive an IS function – the locus of points where savings equalize investment – whose slope is equal to:

$$\frac{du}{d\Pi} = \frac{\frac{df}{dr^e}\frac{\partial r^e}{\partial \Pi} - s\frac{u}{v}}{s\frac{\Pi}{v} - \frac{df}{dr^e}\frac{\partial r^e}{\partial u}}. \tag{5}$$

The sign of equation (5), even assuming that the standard Keynesian stability holds[10] (the denominator higher than 0), cannot be established *a priori*, since it depends on the parameters and on the relative responsiveness of the accumulation and saving functions to variations in u and Π. If the numerator is positive, the economic regime is defined as 'exhilarationist' (Marglin and Bhaduri 1990, p. 166), meaning that an increase in the profit share has a positive effect on the *level* of economic activity; if it is lower than 0, it is defined as 'stagnationist' (ibid., p. 166), entailing that an increase in the wage share is necessary to attain a higher *level* of aggregate demand.

9. For a detailed discussion, see Garegnani (1978). It is, however, important to remark that the argument discussed here is not logically necessary to the Marglin–Bhaduri model, which is completely compatible with a demand-led approach to growth.
10. The Keynesian stability condition requires that savings are more reactive to variations in capacity utilization than investment and implies that the marginal propensity to spend (the sum of the parameters of the induced components of demand) is smaller than 1. As Freitas and Serrano (2015, p. 262) notice, this condition is equivalent to maintaining that output is demand-determined.

It is important to recall that in the Marglin–Bhaduri theoretical construction, and moreso in general in neo-Kaleckian models, a change in one of the exogenous parameters (as the profit share in the above example) leads to a new equilibrium level for the degree of capacity utilization, as a consequence of a variation in demand with given productive capacity. However, this new level of u persists over time. Indeed, in these models (i) no attempt is made to attain normal capacity utilization and (ii) the rate of accumulation and the rate of output growth are assumed to be coincident. Hence the numerator and the denominator of u evolve in parallel after the exogenous shock. This implies that the short-run outcome of a change in the profit share, which is represented by the variation in u, extends its effects also to the long-run, the time horizon usually referred to when economic growth is studied.

Marglin and Bhaduri (1990) provide a further categorization, dividing economic regimes between cooperative and conflictual. In the first, the interests of capitalists and workers are shown to coincide. This situation prevails when the *rate* of profit and – curiously enough given that the comparison is between a relative and an absolute magnitude – the wage *bill* move in the same direction when capacity utilization varies. In the second, on the other hand, the expansion of activity is beneficial only for one class and detrimental to the other (the rate of profit and the wage bill react to a change in u by moving in opposite directions), the economic regime is defined conflictual.

Combining the various classifications, it is possible to arrive at a matrix, which shows the famous concepts of wage-led and profit-led growth regimes, terms that refer to economic regimes in which a rise in the wage share causes, respectively, an increase or a decrease in the rate of growth of the economy (see Table 1).

We may recall that, according to equation (4), the rate of accumulation/rate of growth is proportional to the rate of profit. This implies that the only case for wage-led growth is given by the intersection of cooperation and stagnationism. In fact, in this last case an increase in the wage share leads, by definition, to an increase in the rate of capacity utilization.[11] Being the cooperative regime, this also leads to an increase in the rate of profit[12] and consequently in the rate of growth.

Notably, the temporal framework to which the model refers in its original version is claimed to be 'a longer run than the textbook short run in which capacity utilization is the sole adjusting variable' (Marglin and Bhaduri 1990, p. 167). On the other hand, in the twin paper (Bhaduri and Marglin 1990, p. 384), 'the focus is entirely on the short period' and the discussion is limited to the reactions of the *level* of aggregate demand to variations in the profit share, on the basis of the same concepts of stagnationist and exhilarationist regimes.

Table 1 Taxonomy of economic regimes

	Exhilatationist	Stagnationist
Cooperative	Profit-led	Wage-led
Conflictual	Profit-led	Profit-led

11. Obviously, these two events have a positive effect on the wage bill.
12. In spite of the fact that the profit share is now lower, the positive effect on r of a higher u, in this case, prevails.

Traces of the dichotomy between these two different versions of the model can be found also in the following literature. In the spirit of Bhaduri and Marglin (1990), some recent works such as Stockhammer et al. (2009), Onaran et al. (2011), Stockhammer et al. (2011), and Stockhammer and Onaran (2012) confine their analysis to the short run. The terms 'wage-led' and 'profit-led' are utilized there to identify regimes in which the increase in the wage share has, respectively, positive and negative effects on the *level* of demand.[13] Since in these last cases productive capacity is taken as given and fixed, a variation in demand leads to a variation in the degree of capacity utilization in the same direction. Hence, the two possible scenarios correspond to the stagnationist and exhilarationist regimes of Marglin and Bhaduri (1990). Lavoie and Stockhammer (2012) distinguish between the impact of variations in functional income distribution on demand, qualified by them as the short-run effect and leading to wage-led and profit-led demand regimes, and the impact on the rate of accumulation – the long-run effect – that generates wage-led or profit-led investment regimes, which are analogous to the Marglin and Bhaduri (1990) growth regimes. Hein and Vogel (2008), Hein and Tarassow (2010), and Hein (2012) study both demand and growth regimes.

The discussion will concern, from now on, issues related to the original version of the model, as presented in Marglin and Bhaduri (1990), to assess both its level and growth outcomes. Moreover, and for the sake of simplicity, the present analysis will focus exclusively on the effects of changes in income distribution on the equilibrium level of capacity utilization (with the related distinction between stagnationist and exhilarationist regimes) and on the rate of growth of the economy (profit-led versus wage-led regimes), leaving aside the cooperation/conflict dichotomy.[14]

A simple graphical analysis can be useful to capture the main features of the model and to introduce my criticisms. I utilize a linear specification[15] of equation (3), expressed by equation (6):

$$g^K = \alpha + \beta u + \gamma \Pi, \tag{6}$$

where α can be seen as a parameter related to capitalists' assessed trend growth of sales and β and γ are positive parameters. Relaxing the assumption that only capitalists save,[16] we obtain a modified version of equation (2):

$$g^S = \frac{S}{K} = \frac{s_\pi \Pi Y + s_w (1-\Pi) Y}{K} = [s_\pi \Pi + s_w (1-\Pi)] \frac{Y}{K} = \sigma(\Pi) \frac{u}{v}, \tag{7}$$

with $\sigma(\Pi)$ equal to the aggregate marginal propensity to save. The latter is a positive function of the profit share $(\sigma'(\Pi) > 0)$, on the basis of the assumption that the

13. On the contrary, in Marglin and Bhaduri (1990) wage-led and profit-led refer to alternative *growth* regimes.

14. For a critical discussion of this aspect of the model, see Cavalieri et al. (2004).

15. Equation (6) is consistent with Marglin and Bhaduri's own approach, which treats 'profit share and capacity utilisation as independent and separate arguments in an investment function' (Bhaduri and Marglin 1990, p. 380) and is a widely used specification for equation (3). See for example Hein and Vogel (2008, p. 485) and Lavoie (2014, p. 371).

16. As Blecker shows (Blecker 2002, pp. 138-139), the adoption of a linear investment function does not rule out the possibility for domestic demand to be exhilarationist, when savings out of wages are allowed. On the other hand, if workers' propensity to save is 0, an investment function like (6) implies a stagnationist outcome. See also Hein and Vogel (2008, p. 485, fn 1).

marginal propensity to save out of profits s_π is higher than the propensity to save out of wages s_w, as it is commonly done in the heterodox literature.[17]

We can solve the IS condition – $g^K = g^S$ – for the equilibrium degree of capacity utilization u^*, obtaining

$$u* = \frac{\alpha + \gamma\Pi}{\frac{\sigma(\Pi)}{v} - \beta} \tag{8}$$

and the related steady-state growth rate, equal to

$$g* = \frac{(\alpha + \gamma\Pi)\sigma(\Pi)}{\sigma(\Pi) - \beta v}. \tag{9}$$

Equations (6) and (7) can be reported in Figure 1,[18] with g^K and g^S expressed as increasing functions of u.[19]

Starting from the initial equilibrium 0, given by the intersection of the curves (g^{K_0}, g^{S_0}), to which correspond the level of capacity utilization u_0 and the rate of accumulation g_0, an exogenous increase in the profit share shifts upward the investment function, whose intercept is equal to $\alpha + \gamma\Pi$, and rotates leftward the saving function. The relative reaction of the two curves depends on the parameters measuring the responsiveness to u and Π.

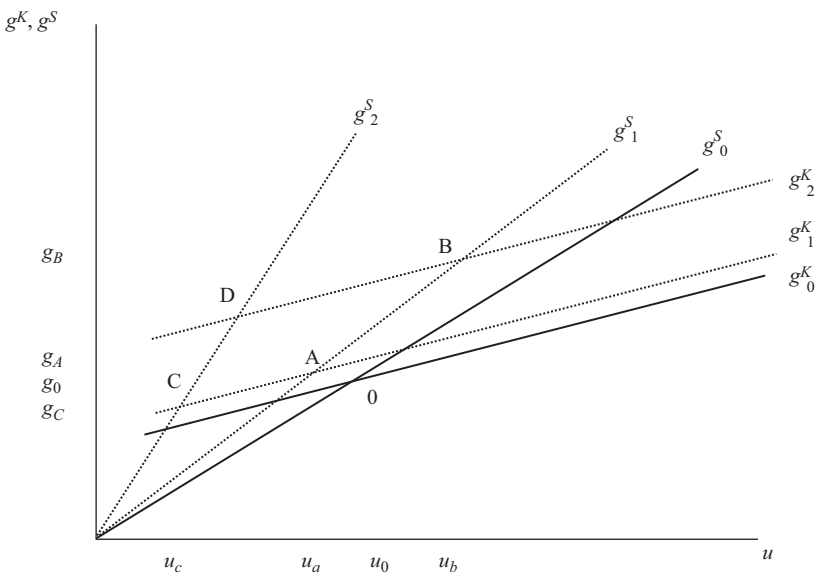

Figure 1 The effects of an increase in the profit share in a standard Marglin–Bhaduri model

17. See, for example, Kaldor (1955/1956).
18. Lavoie and Stockhammer (2012, p. 11) present a similar graphical representation of the Marglin–Bhaduri model.
19. Given that the Keynesian stability is assumed to hold, the g^S curve is steeper than g^K.

If the new situation of the economy is represented by the curves (g^{K_1}, g^{S_1}), the corresponding equilibrium point A represents a stagnationist demand regime and a profit-led investment/growth regime, as can be seen respectively on the u-axis and the g-axis and recalling that u, coherently with Marglin and Bhaduri (1990), is utilized as a proxy for demand.

If the reaction of investment to the increase in the profit share is stronger than in the previous case, so that the g^K curve shifts to g^{K_2}, while the impact on savings is the same (therefore, the economy is now represented by the g^{K_2} and g^{S_1} curves), we obtain the equilibrium point B. This depicts an exhilarationist demand regime and a profit-led investment/growth regime.

If, finally, consumption is very sensitive to variations in functional income distribution and the saving function rotates up to g_2^S while the impact on investment is still represented by g_1^K, the intersection point C reveals a stagnationist demand regime and a wage-led investment/growth regime.[20]

Let us now turn to some criticisms of this model, with a particular concern on its investment function.

3 SOME CRITICAL ASPECTS OF THE MODEL

3.1 The Marglin–Bhaduri investment function and autonomous demand

The Marglin–Bhaduri model is built on the assumption of a closed economy, without government or possibility for credit-financed consumption. Hence, it does not consider the existence of components of aggregate demand other than induced consumption and investment. Given their relevance and their undeniable existence in real-world economies, I will include in the picture these components – the autonomous demand – arguing that this leads to two main results: (i) the taxonomy introduced in Table 1 no longer holds; and (ii) the Marglin–Bhaduri accumulation function appears questionable.

In my critical discussion of the investment function proposed by Marglin and Bhaduri and adopted in the literature inspired by their contribution, I will assume that productive units decide their gross investment in order to endow themselves with the capacity necessary to produce the amount they expect to be demanded at normal prices.

It can be reasonably assumed that firms' objective is to produce in the most efficient, cost-minimizing way; that is to say, they aim to operate their productive capacity at its 'normal' level, as defined for example by Kurz (1986) and Shaikh (2009),[21] which will be in general lower than full utilization. Finally, to appreciate properly the fundamental role of investment, it is necessary to take into account also its double nature, because this allows a proper analysis of the persistent and non-transitory effects on the economy of a shift in income distribution. Indeed, investment is the driving

20. The possible equilibrium given by the intersection of g^{K_2} and g^{S_2} (point D), is characterized by regimes analogous to those of point A.

21. 'The "normal" degree of capital utilization refers to the cost-minimizing system of production' (Kurz 1986, p. 38); 'The normal rate is determined by the (real) cost structure of the firm … the minimal cost rate of capacity utilization is largely immune to variations in the actual rate of capacity utilization' (Shaikh 2008, p. 461). See also the seminal contribution of Steindl (1952), with his introduction of the concept of 'planned excess capacity' (p. 127) as a firm's strategic choice to be able to meet efficiently peaks of demand and to discourage possible entrants.

force of the productive capacity and of the potential output of an economy. At the same time, it is also an important component of aggregate demand. Its evolution contributes, together with the other components of demand, to the determination of the rate of growth of aggregate demand and actual output. As will be argued below, the absence of autonomous demand in the Marglin–Bhaduri model does not allow a full recognition of investment's double role.[22]

With these premises in mind, I will argue that, if proper consideration is given to the capacity-generating effects of investment and to the existence of autonomous components of aggregate demand in addition to investment and induced consumption, the Marglin–Bhaduri accumulation function leads to untenable results that question the solidity of the function itself and, to some extent, circumscribe the relevance of the taxonomy introduced in the previous section.

As has been discussed above, the most 'prudential' versions[23] of the Marglin–Bhaduri model, those which confine their analysis to the effects on the *level* of aggregate demand and which I will not discuss in detail here, explicitly limit their focus to the short period, when productive capacity is fixed and eventual increases in the produced output can be brought about only through a more intensive utilization of the existing capacity.

On the other hand, the model originally presented in Marglin and Bhaduri (1990), which is the main object of my discussion, and its most 'ambitious' subsequent versions, claim to extend the results to the medium to long run. In doing this, they present some unsatisfactory aspects. A dichotomy seems in particular to be present: either potential output is still taken as given and fixed, with no room for the capacity-generating effects of investment,[24] or it is assumed to be always growing in line with actual output. In this last case, it seems plausible to argue that the absence of an explicit distinction between a specific equation explaining the temporal evolution of productive capacity and an equation tracking the path of actual output can be attributed to the fact that neo-Kaleckian models – and their Marglin–Bhaduri version – claim themselves to be investment-driven. For this reason, there is the tendency to identify the rate of capital accumulation (I/K) with the rate of growth of demand and output. This is consistent with either (i) the neglect of the existence of the autonomous components of demand, as Marglin and Bhaduri (1990) do; or, alternatively, with (ii) the arbitrary assumption that these components grow at the independently determined rate of accumulation, as it is proposed by some other authors, according to which, for example, public spending G is 'a constant proportion of the capital stock' (Blecker 2002, p. 140), or credit-financed consumption is such that 'debt must grow at the same rate as the capital stock' (Palley 2014, p. 20). This, obviously, means that the rate of growth of these components is no longer autonomous at all, being by definition equal to g^K. Anyway, in both cases demand (output, the numerator of u) and productive capacity (potential output, the denominator of u)[25] evolve always at the same rate g^K and any equilibrium level of u obtained with given

22. See also Cardoso and Crespo (2014), where a similar argument is developed.
23. See Stockhammer et al. (2009), Onaran et al. (2011), Stockhammer et al. (2011), and Stockhammer and Onaran (2012).
24. This is explicitly admitted in Hein and Vogel (2008, p. 485) in the discussion of their equilibrium results: 'Whereas equilibrium capacity utilization indicates equilibrium activity with *given* productive capacities …' (emphasis added), but this is quite at odds with their objective to investigate 'the long-run relationship between distribution and growth' (p. 481).
25. From the definition of the given technical capital–normal output ratio $v = K/Y^n$, we can see that, under the assumption of a constant v, $g^{Y^n} = g^K$.

potential/normal output will be maintained also beyond the short run, when the new productive capacity is installed.

Following the seminal contribution of Serrano (1995) and the further developments of Lavoie (2014) and Allain (2015),[26] it is possible to integrate the autonomous components of demand into a Marglin–Bhaduri model of growth and distribution. I qualify as autonomous those components 'that are neither financed by the contractual (wage and salary) income generated by production decisions, nor are capable of affecting the productive capacity of the capitalist sector of the economy' (Serrano 1995, p. 71) and whose rate of growth can be taken, in this framework, as exogenously given: public expenditure, exports, and autonomous, credit-financed consumption.

Once the autonomous components of aggregate demand are taken into account, the IS condition of equilibrium on the goods market is represented by:

$$I = S_{\pi}\Pi Y + S_{w}(1-\Pi)Y - Z = S, \tag{10}$$

where Z are the already mentioned autonomous components, while the other terms are analogous to those in equation (7). For the sake of simplicity, I will consider a closed economy.[27] Dividing all terms by K, the stock of capital, we can rewrite the IS equilibrium condition as:

$$g^{K} = \sigma(\Pi)\frac{u}{v} - \frac{Z}{K} = g^{S}, \tag{11}$$

with g^K defined according to equation (6) and $\sigma(\Pi)$ as in equation (7).

We can imagine starting our analysis with an equilibrium situation, in which it is assumed that productive capacity is utilized at its normal, target level and that $g^K = g^S = g^Z (= g^Y)$. In this position, all the components of demand evolve at the same rate of growth. Moreover, productive capacity also grows in line with aggregate demand and u remains at its normal level.

Let us now suppose a shift in income distribution. In the first stage, the effects will be the same as in the standard model, depicted in Figure 1: if for example Π increases, the g^K curve shifts upward and g^S (whose vertical intercept in the $<u,g>$ space is no longer zero but negative and equal to $-Z/K$) rotates leftward. But at this point, independently from the specific economic regime, the new intersection occurs at a level of g^K that is different from the exogenously given g^Z, with the consequence that the ratio of Z over K varies over time accordingly to:

$$\left(\frac{\dot{Z}}{K}\right) = \frac{Z}{K}(g^{Z} - g^{K}), \tag{12}$$

and the g^S curve shifts as long as these two rates of growth diverge.[28]

On this basis, it is now possible to reconsider the cases shown above in Figure 1. We can begin with an economic regime that should be, according to the previous

26. Lavoie (2014) and Allain (2015) provide a formalization of a neo-Kaleckian model with some components of demand growing at a rate independent from the output rate of growth.
27. It will be argued below that the argument does not change in an open economy.
28. Lavoie (2014, p. 407) proves that the Keynesian stability condition – which is assumed to hold here – guarantees that the Z/K ratio converges to a stable equilibrium value, which also implies the convergence of g^K to the exogenously given g^Z.

definitions and in a standard version of the model, exhilarationist for what concerns demand and profit-led for growth.[29]

The increase in Π is assumed to have expansionary effects on demand, given a supposed positive impact on investment larger than the negative impact on consumption. Hence, the short-run effect of an increase in the profit share is the displacement of the economy from 0 to 1.[30] As it is possible to see from Figure 2, as soon as new productive capacity is built (that is to say, as soon as investment starts to produce its long-run effects), the economy no longer remains in 1. In fact $g_1 > g^Z$ implies that the ratio of Z over the stock of capital gradually decreases and the g^S curve starts to shift upward, until the new equilibrium point 2 is reached, where again $g^K = g^S = g^Z$. Unless the

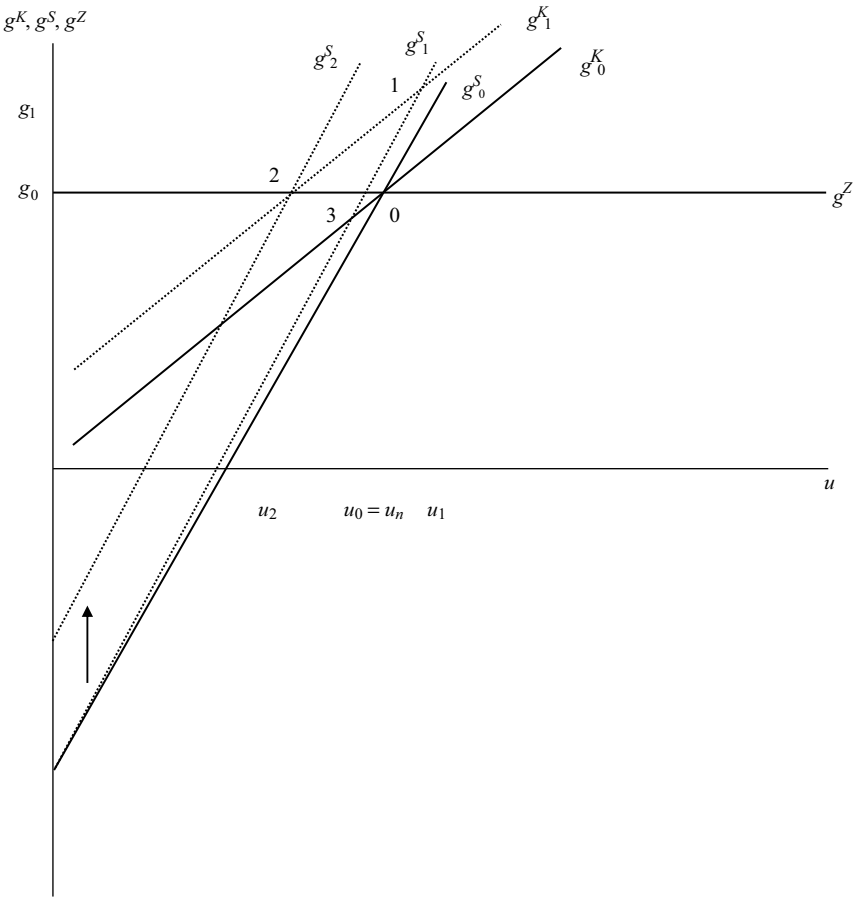

Figure 2 The effects of an increase in the profit share in a Marglin–Bhaduri model with autonomous demand: the exhilarationist, profit-led case

29. This implies that, after an increase in the profit share, we should expect a rise in the equilibrium level of u and an accelerating growth.
30. This is analogous to what happened in Figure 1, with the passage from 0 to B.

variation in income distribution is capable of modifying g^Z, the rates of growth and accumulation of the economy are not affected. Besides, it may be useful to recall that in neo-Kaleckian models capacity utilization is the adjusting variable of any exogenous shock and, if the equilibrium level for capacity utilization is different from u_n, there is no attempt to restore a normal level of utilization. Given this, in spite of having classified the model as exhilarationist – an increase in the profit share should cause an increase in the equilibrium degree of capacity utilization – according to the Marglin–Bhaduri terminology, the economy ends up, after the increase in Π, in a position of rest in which the equilibrium degree of capacity utilization is lower than at the starting point. The economic rationale behind this process is intuitive: after the rise in the profit share, given the model's investment function, capacity grows for a while more than proportionally to aggregate demand and output, due to the negative effects on consumption and to the presence of autonomous components that, in principle, are not affected by the expansion of investment. As a result, after that the saving function has completed its adjustment through variations in the *Z*/*K* ratio, the economy ends up in a position such as 2, in which firms have endowed themselves with more productive capacity than the one required to meet aggregate demand at the target degree of utilization.

It should be noted that the expansion of investment decided by capitalists after an increase in their income share goes against their own interests.[31] If, in fact, they did not shift their accumulation function, the economy would move towards the intersection of g^{K_0} with g^{S_1} (point 3). But in this position, $g_3 < g^Z$ and the g^S curve would shift downward until the economy is back in 0, where the actual rate of profit is higher[32] than in 2 and production is carried on at the desired level of capacity utilization.

The same exercise can be repeated for an economy characterized by a stagnationist demand regime and a profit-led growth/investment regime, as per case A in Figure 1. Once again, the short-run effect of an increase in the profit share is the displacement of the economy, in Figure 3, from 0 to 1, analogously to the movement from 0 to A in Figure 1. When investment begins to deploy its capacity-building effects, the economy moves gradually from 1 to 2 and capacity utilization suffers a further decrease, as is shown in Figure 3.

Given that:

$$\dot{u} = u(g^Y - g^K), \tag{13}$$

the reduction in the equilibrium capacity utilization is perhaps less surprising than in the case depicted in Figure 2, considering that in the transition from 0 to 1 total demand and the accumulation rate move in opposite directions, with the first decreasing and the second increasing.[33] The obvious result is that the capital endowment of the economy exceeds the productive requirements of firms, which have to run their

31. The argument works also in the case of a reduction of the profit share, in an analogous economic regime. Assuming that, in the initial position, capacity utilization is at its normal, desired level, if capitalists react to a decrease in Π shifting down their accumulation function, they will end up in a new equilibrium situation with a higher capacity utilization, which means short-run extra profits but that it is not optimal in the long run, the time span relevant for the computation of the normal degree of capacity utilization.

32. See equation (1).

33. This aspect should suffice, even without considering autonomous demand, to make evident the implausibility of the stagnationist, profit-led regime, whose equilibrium outcome, after a change in the income shares, is a lower (higher) degree of capacity utilization with a higher (lower) rate of accumulation.

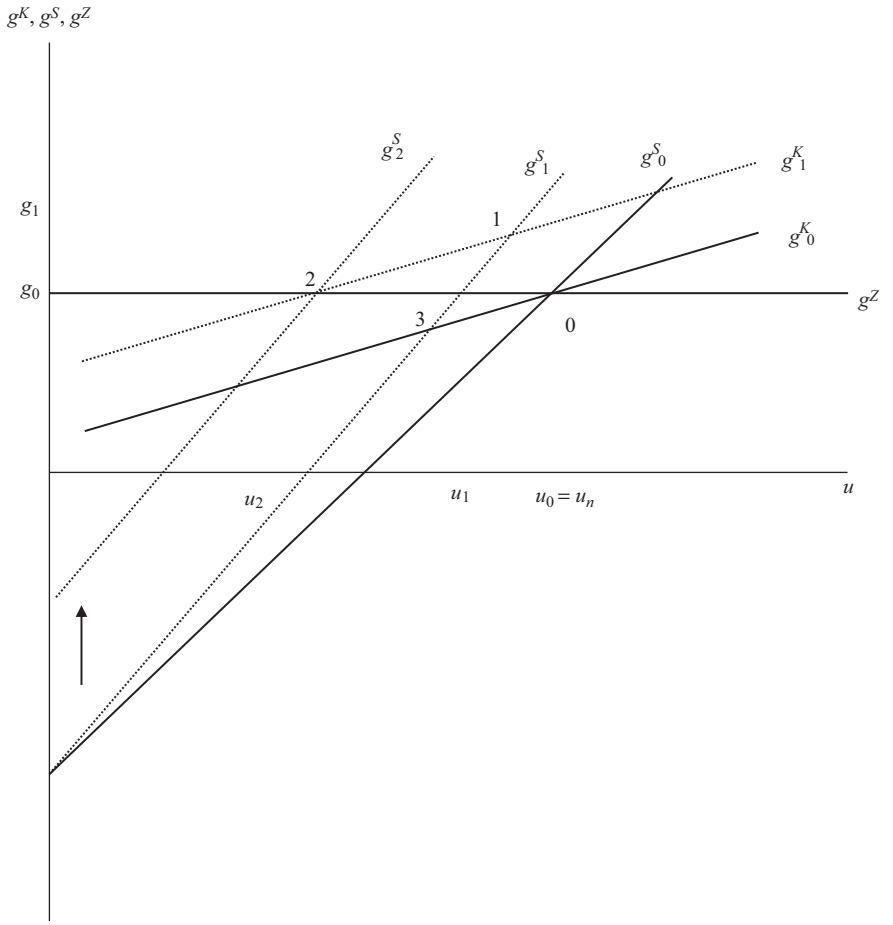

Figure 3 The effects of an increase in the profit share in a Marglin–Bhaduri model with autonomous demand: the stagnationist, profit-led case

plants at a sub-desired level. Furthermore, as in the previous case, the rate of accumulation tends to equalize the exogenously given g^Z.

Let us finally analyse the case of an economy characterized by a consumption function very sensitive to income distribution and by an accumulation function that reacts more to u than to the profit share. This would give rise, in the original case, to a stagnationist regime for demand and to a wage-led regime for growth and investment (the case C in Figure 1).

In the augmented version of the model adopted in this section, with Z in play, the increase in the profit share leads, in Figure 4, to a position – 2 – that is still stagnationist (the equilibrium degree of capacity utilization is reduced). However, with respect to the case depicted in Figure 3, the negative impact on u is smaller, given that the accumulation of capital and aggregate demand move, in the transit from 0 to 1, in the same direction, negative in the case under observation. Nonetheless, the fact that the g^K

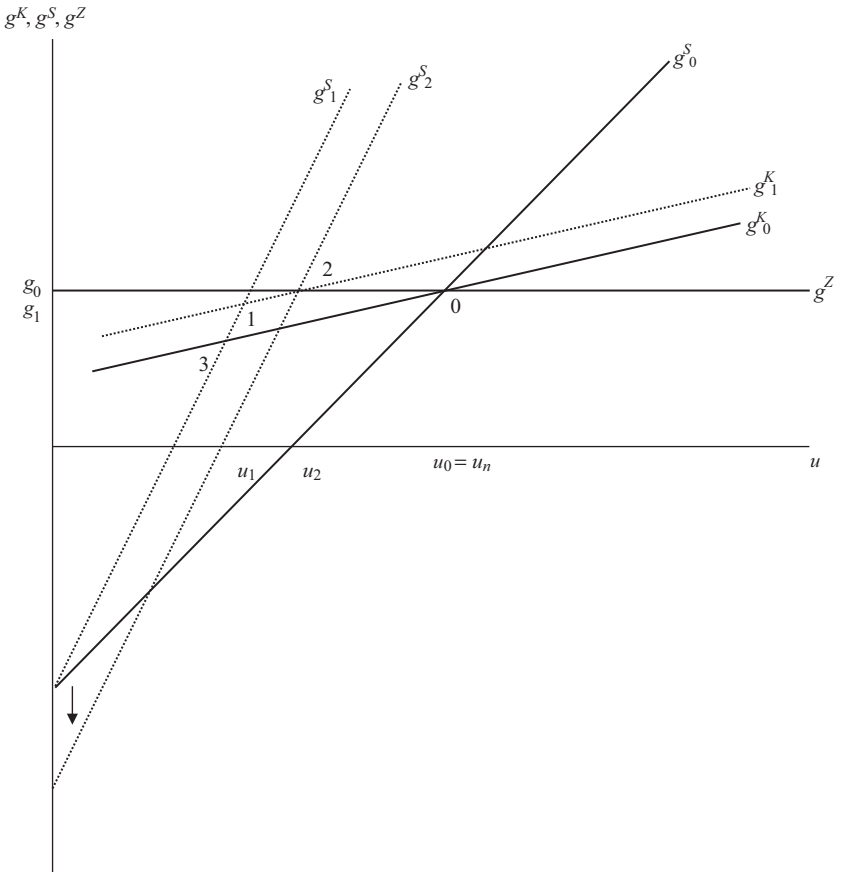

Figure 4 The effects of an increase in the profit share in a Marglin–Bhaduri model with autonomous demand: the stagnationist, wage-led case

curve shifts upward makes the reduction in investment less than proportional to the reduction in aggregate demand, with the result that $u_2 < u_0$. On the contrary, if the accumulation function remained the original one, that is to say if capitalists did not positively react in the absence of a demand increase, the equilibrium degree of capacity utilization would be unaffected. Indeed, in this event the economy would move first towards 3 and then come back to 0.

With the three examples above it has been shown that, if proper consideration is given to the existence of components of aggregate demand growing at a rate that is autonomous with respect to actual and expected income, a rate which is not arbitrarily assumed to be equal to the rate of capital accumulation and that is also largely independent from income distribution,[34] the analysis of a shift in functional income distribution,

34. As shown by Thirlwall (2011), a once-and-for-all variation in the wage level, with the subsequent change in the real exchange rate, caused by the variation in the internal price level, is not capable of affecting permanently the rate of growth of exports, one of the components of Z, but only of generating a once-and-for-all shift in their level.

beyond the simple short-run, impact effect, leads to different results with respect to Marglin–Bhaduri's ones. Indeed, independently from the magnitude of the different reaction parameters, a rise in Π leads to a reduction in the equilibrium value of u: if it no longer can be assumed that the rate of accumulation and the rates of growth of aggregate demand and output always coincide, with the former rate determining the other two, investment growing faster than aggregate demand causes a fall in capacity utilization (and vice versa). This means that the positive (negative) entrepreneurs' reaction to an increase (decrease) in their income share, postulated by the Marglin–Bhaduri investment function, implies the construction of a stock of capital inefficiently high (low), larger (smaller) than the one required to meet incoming demand at the desired intensity of utilization of the productive capacity.

It seems possible to conclude that there are not good reasons to expect such accumulation behavior from capitalists and that the model's aggregate investment function appears at least problematic.

A similar argument was developed, several decades ago, by Josef Steindl (1952, p. 131, emphasis added):

> [I]f an industry raises its rate of profits, then it will in fact tend to a lower degree of utilisation, because the incentive of the higher profit rate will make it expand more quickly in the first instance. The reduced utilisation, however, will discourage investment, and at some point, this discouraging effect will outweigh the stimulating effect of the increased profit rate, so that industry will again expand at its previous rate, and thus avoid a *further* fall in utilisation.

In his influential 1952 book, the Austrian economist, who accepts the dependence of investment on the profit rate, points out that, if this distributive variable increases, u will decrease. To avoid this problem, Steindl (1952, p. 134) argues, the profit margin should be elastic and react to possible discrepancies between u and u_n. Its argument runs as follows: if, for any reason, the rate of growth of capital increases above the rate of growth of aggregate demand (for example, because of an increase in the profit share, with the corresponding upward shift in the g^K curve in the previous figures), the only way to keep utilization stable at its desired level is through a self-correcting reduction in the profit margin, or mark-up in the Kaleckian literature, to counteract the previous positive stimulus. Given that, in Steindl's opinion, this elasticity of the profit margin is not likely to occur, capitalists' own behavior leads to an undesired reduction in the degree of capacity utilization.

It appears possible to agree with the Austrian economist's argument, according to which an increase in the accumulation rate, stimulated by a rise in the profit share and not justified by an expected increase in aggregate demand, leads to over-accumulation. However, the premise (the accepted dependence of I on Π) which leads Steindl to consider these undesired variations in u as necessary and unavoidable, seems disputable. On the other hand, it appears more reasonable to argue that capitalists, being aware of the eventual undesired effects of a rise in investment not matched by a corresponding increase in demand, will not react at all to an increase in their profit share.

To summarize, in spite of Marglin and Bhaduri's claims, at the aggregate level capitalists cannot just assume that their output can be sold (Marglin and Bhaduri 1990, p. 173), cannot altogether simply be 'confident of their ability to sell extra output,' and cannot overlook 'whether or not they can sell additional output' (ibid., p. 168).

Moreover, the interpretative power of the taxonomy introduced in Table 1 is somehow downscaled: growth is neither wage- nor profit-led, while the exhilarationist demand regime, defined in Marglin and Bhaduri (1990), is no longer a feasible option.

As shown in Figures 2–4, if the investment behavior is defined by equation (3), an increase in the profit share always leads to a reduction in the equilibrium degree of capacity utilization.[35]

It seems possible to argue that, for a more satisfactory treatment of aggregate investment in a baseline model of accumulation and distribution, two paths are open: if a significant impact of variations in the profit share on investment is maintained, then a second-stage process of adjustment of the productive capacity to the long-period level of demand must be modeled and discussed as well. In this case, the profit sensitivity would be ephemeral and temporary, and would be counteracted by firms' attempt to restore an adequate endowment of capital stock. As is well known, this is not what happens in neo-Kaleckian models,[36] where the equilibrium degree of capacity utilization bears the brunt of the equalization between investment and savings and is, in principle, free to range between zero and full utilization. In this respect, the Marglin–Bhaduri version of the neo-Kaleckian model presents the supplementary problem that not only is production carried over persistently at a level of u different from the desired one, but entrepreneurs exacerbate actively this situation with their deliberate investment behavior.

Given these difficulties, an alternative approach would regard investment as exclusively induced, depending on expected demand[37] (that forthcoming at normal prices) and quite insensitive to income shares. As Garegnani put it over 50 years ago,[38] to argue the exclusion of the rate of profit from his analysis of the determinants of investment,

> [t]he rate of profit on new investments appears not to be a factor that influences investment independently of the two factors mentioned in the text [Garegnani is referring to demand expansion and technical innovation]; it seems, rather, to be how the influence of those two factors manifests itself. Thus, if there is an increase in final demand, entrepreneurs will anticipate being able to sell additional quantities of goods at current or higher prices, and investment will appear to be profitable, whereas it would not appear so without the increase in final demand … In the economy as a whole, therefore, the total amount of profits, and hence of undistributed profits, will depend on the level of investment rather than vice-versa. (Garegnani 2015, pp. 11–12)

This appears confirmed by the findings of the most recent empirical contributions in the wage-led/profit-led literature. For example Onaran et al. (2011, p. 649) find

35. From simple computations, it is possible to see that the equilibrium degrees of capacity utilization of Figures 2–4 are given by $u_2 = (g^Z - \alpha - \gamma\Pi)/\beta$. For a formal analysis, see Section 3.2 and Lavoie (2014, pp. 406–409).

36. For a detailed discussion, see for example Hein et al. (2011; 2012), Skott (2012), and Cesaratto (2015). A relevant exception of a post-Keynesian model with an equilibrium-normal degree of capacity utilization is represented by the older models of growth and distribution based on the Cambridge Equation. For a discussion of the weaknesses of these models, see Ciccone (1986).

37. This conclusion is independent from the existence or not of a mechanism assuring that expectations will be fulfilled in the long run and/or that the long-period equilibrium will be characterized by a normal utilization of productive capacity and whether or not this equilibrium will be dynamically stable. For a detailed discussion of arguments in favor of the feasibility of a long-run, demand-driven stable equilibrium with $u = u_n$ and with growth led by the autonomous components of demand, see for example Freitas and Serrano (2015).

38. The original reference is Garegnani (1962), recently translated into English and published as Garegnani (2015).

that 'there is no long-run relationship between the profit share and investment,' Stockhammer et al.'s (2011, p. 8) results show 'a statistically insignificant effect of profits on investment,' and Onaran and Galanis's (2012, p. 17) show that 'the profit share has no statistically significant effect on investment.'

3.2 A simple, formal analysis of a Marglin–Bhaduri model with autonomous demand

It is possible to summarize the arguments presented in the Section 3.1 by means of a simple, formal analysis of a Marglin–Bhaduri model, integrated with an explicit consideration of autonomous demand. For this purpose, I will rely on an analogous exercise, performed in Lavoie (2014), where the properties of a neo-Kaleckian model[39] of growth and distribution with autonomous demand are illustrated and discussed.

We can begin from the IS condition (11), $g^K = \sigma(\Pi)\frac{u}{v} - \frac{Z}{K} = g^S$, introduced above and given by the equalization of the accumulation function (6), $g^K = \alpha + \beta u + \gamma\Pi$, and the saving function with autonomous demand, $g^S = \sigma(\Pi)u/v - Z/K$. Assuming an increase in the profit share, from Π to Π_1, I solve (11) for the short-run equilibrium degree of capacity utilization, which corresponds to the position u_1 in Figures 2, 3, and 4. I obtain:[40]

$$u_1 = \frac{\alpha + \gamma\Pi_1 + Z/K}{\frac{\sigma(\Pi_1)}{v} - \beta}. \tag{14}$$

I have already noticed that, independently from the specific economic regime, the economy moves away from u_1 as soon as investment starts to produce its long-run effects and the new capital stock is installed. Indeed, the Z/K ratio varies continuously so long as the rate of accumulation and the exogenously given rate of growth of Z diverge, through the law of motion (12), $\left(\frac{\dot{Z}}{K}\right) = \frac{Z}{K}(g^Z - g^K)$, which can be expressed as:[41]

$$\left(\widehat{\frac{Z}{K}}\right) = (\dot{Z/K})/(Z/K) = g^Z - (\alpha + \beta u_1 + \gamma\Pi_1). \tag{15}$$

Consistently with what Lavoie (2014) finds for the neo-Kaleckian model with autonomous demand, it is possible to prove that the derivative of $\left(\widehat{\frac{Z}{K}}\right)$ with respect to (Z/K) is always negative, if the Keynesian stability condition holds. As discussed above, this is the case for the Figures 1–4 and it amounts to saying that the denominator of (14), $\sigma(\Pi_1)/v - \beta$, is greater than zero:

$$\frac{d\left(\widehat{\frac{Z}{K}}\right)}{d\left(\frac{Z}{K}\right)} = \frac{-\beta}{\frac{\sigma(\Pi_1)}{v} - \beta} < 0. \tag{16}$$

39. With this term, I am referring to a model whose accumulation function is described by $g^K = \alpha + \beta(u - u_n)$.
40. Plugging the value of u_1 into equation (6), it is possible to get the short-run equilibrium growth rate, equal to $g_1 = \frac{(\alpha + \gamma\Pi_1)\sigma(\Pi_1) + \beta v Z/K}{\sigma(\Pi_1) - \beta v}$.
41. See Lavoie (2014, p. 407).

From condition (16), it derives that the ratio of Z over K converges to a stable equilibrium value.[42] This also implies that the rate of accumulation converges to g^Z, as happens in Figures 2–4, where the economy is shown to tend to the positions labeled with 2, described by (u_2, g^Z). From $g^K = g^Z$, it can be easily found that:

$$u_2 = \frac{g^Z - \alpha - \gamma\Pi_1}{\beta}, \tag{17}$$

from which it can be concluded that, if the investment behavior is described by a function like equation (6) and a positive influence of the profit share is maintained, any increase in the latter leads to a reduction in the equilibrium degree of capacity utilization. In Marglin–Bhaduri's terminology, this means that the economy would always be stagnationist.

4 CONCLUSIONS

The proponents of the Marglin–Bhaduri approach praise the model for its supposed elasticity and capability to provide various scenarios and regimes but, as I have attempted to argue in the present essay, this elasticity is to some extent artificial and depends on an implausible investment function. Moreover, the model neglects the existence of components of aggregate demand other than induced consumption and investment. Once these components are properly considered – where *properly* implies that they are not arbitrarily assumed to grow at the rate of capital accumulation, as is done in some neo-Kaleckian literature – some conclusions follow: first of all, the validity of the famous Marglin–Bhaduri taxonomy, presented in Table 1, is questioned. Growth is driven by autonomous demand, hence is neither wage- nor profit-led. Moreover, the exhilarationist demand regime, defined as in Marglin and Bhaduri (1990), is no longer a feasible option: an increase in the profit share leads to a reduction in the equilibrium degree of capacity utilization, regardless of the relative magnitudes of the parameters involved.

Second, and strictly related to the previous point, it is possible to stress more clearly some weaknesses of the investment function. It has been proved, by means of a simple graphical analysis, that the consideration of autonomous demand allows capacity and output to grow, during the disequilibrium adjustments, at different rates. On this basis, I have claimed that a rise in investment simply motivated by an increase in capitalists' income share generates an accumulation temporarily faster than the growth of aggregate demand and output. This implies an over-endowment of capital, which means producing the quantities demanded at a degree of capacity utilization inefficiently low. For this reason, I have raised doubts about an independent and persistent influence of the profit share on the aggregate investment behavior. Indeed the contingent existence, in the investment function, of a factor of permanent disturbance of the process of adaptation of productive capacity to aggregate demand would simply lead to a production permanently and deliberately carried over with an unsatisfactory endowment

42. If Z/K increases (decreases), its rate of growth decreases (increases), until the latter approaches 0. As a referee pointed out, depending on the parameters and the magnitude of the exogenous terms of the model, the ratio Z/K could converge to zero. This is because the Marglin–Bhaduri investment function adopted (equation (6)) includes an autonomous component, which directly affects the evolution of the capital stock. I assume that the configuration of the model is such that the economy converges to an equilibrium position where Z/K is positive.

of capital. This aspect transcends the standard critique, raised to neo-Kaleckian models of growth and distribution, of the non-plausibility of a steady-state equilibrium with a level of capacity utilization different from its normal level. If in that case the entrepreneurs' problem was one of passivity – the lack of reaction to an equilibrium level of u different from u_n – in the circumstance under discussion here capitalists contribute, with their own active investment behavior, to an outcome negative for their own interests. This allows us to conclude that it would appear preferable not to include functional income distribution among the arguments of the aggregate investment function, which should be considered dependent on the expected rate of growth of aggregate demand.

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