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CONVERGENCE TOWARDS THE NORMAL RATE OF CAPACITY UTILIZATION IN NEO-KALECKIAN MODELS: THE ROLE OF NON-CAPACITY CREATING AUTONOMOUS EXPENDITURES

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ABSTRACT

Neo-Kaleckian models of growth and distribution have been highly popular among heterodox economists. Two drawbacks of these models have, however, been underlined in the literature: first, the models do not usually converge to their normal rate of capacity utilization; second, the models do not include the Harrodian principle of dynamic instability. Some Sraffian economists have long been arguing that the presence of non-capacity creating autonomous expenditures provides a mechanism that brings back the model to normal rates of capacity utilization, while safeguarding the main Keynesian message and without going back to classical conclusions. The present article provides a very simple proof of this, showing within a neo-Kaleckian model that the Harrodian principle of dynamic instability gets tamed by the presence of autonomous consumer expenditures.

1. INTRODUCTION

This article presents a two-step modification of the neo-Kaleckian model. In its simpler version, an autonomous component of consumption by capitalists is added to the canonical investment function of the Kaleckian model, with this autonomous component being assumed to grow at an

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exogenously given rate. In this first version, the actual rate of capacity utilization is not generally equal to its normal or desired value, unless the rate of growth of autonomous capitalist consumption happens to be equal to the constant term in the investment function. In the second and more complex version, there is a Harrodian investment variable that adjusts in the long run to the discrepancy between expected growth in sales and the actual growth of capacity. The long-run equilibrium growth rate in the model is still determined by the exogenously given rate of growth of autonomous capitalist consumption, but it turns out that that under fairly weak conditions the actual rate of capacity utilization will converge towards the normal or desired rate of capacity utilization.

The model is related to a number of theoretical debates in the literature on neo-Kaleckian growth and distribution models and to empirical issues concerning the determinants of growth. Four main points are made in the article. First, it follows Franklin Serrano's (1995a, 1995b) analysis of the so-called Sraffian supermultiplier, thus called because the trend rate of output and productive capacity is determined by exogenous elements, through a multiplier effect that incorporate the accelerator effect due to induced investment. This is done by introducing a new adjustment variable (apart from the usual variables—distribution and capacity utilization) which brings saving and investment into equality. This new adjustment variable is the average propensity to save of capitalists, through the introduction of a non-proportional saving function with a constant term that in the long run grows at an exogenously given rate.

Second, the article attempts to respond to criticisms of basic neo-Kaleckian models because they (allegedly implausibly) do not produce a long-run equilibrium in which actual and normal rates of capacity utilization are equal and because they assume away Harrodian instability. It does so by producing a model that builds in Harrodian instability and ensures (conditionally) that in long-run equilibrium actual and normal capacity utilization are equalized. In so doing, the article is related to Olivier Allain's (2015) recent contribution in two ways. In his neo-Kaleckian model Allain, like Serrano, introduces a non-capacity creating expenditure that grows at a constant rate, in his case, government expenditure. And as we do here, he considers the destabilizing effects of a Harrodian investment function on his modified version of the neo-Kaleckian model, also getting conditional convergence of the actual rate of capacity utilization towards its normal value. One purpose of the present article is to provide a simpler proof of this result.

Third, the model produced implies wage-led growth, not in the sense of raising the long-run equilibrium growth rate of the economy when the wage share rises (and the profit share falls), since the rate of growth of the economy in the medium or long run is determined by the exogenous growth rate of the autonomous part of capitalist consumption, but in the sense of raising the average rate of growth during the *traverse* after the wage share increases—something that many have argued to be a suitable way of examining growth effects, that is, focusing on averages rather than steady-state values. Finally, some empirical justification is provided for the model in terms of discussions of the exogeneity of consumption growth and recent discussions of consumer debt, which provide some autonomy of consumption from income.

The outline of the article roughly follows what has been argued above. In the next section, the autonomous component of consumption by capitalists is added to the standard neo-Kaleckian model of growth and distribution, and the implications of this addition are examined. In the third section, a Harrodian accumulation behaviour is superposed to the previous model, and the conditions under which this more complex model does converge to a stable solution with a normal rate of capacity utilization are examined. We shall see that the required conditions are fairly simple. In the fourth section, there is a discussion about how the present models are related to previous contributions that have been made in the same spirit, namely those of Allain and the recent extensions of Serrano's supermultiplier model made by Fabio Freitas and Franklin Serrano (2013, 2015) and Serrano and Freitas (2015), who also demonstrate a conditional convergence towards a normal rate of utilization. The fifth section presents some empirical evidence and arguments providing support to the theoretical model. The last section concludes.

2. THE SIMPLE VARIANT OF THE NEO-KALECKIAN MODEL

2.1 A frequent objection to neo-Kaleckian growth models

A key feature of the neo-Kaleckian model is that the rate of capacity utilization is endogenous. In the canonical model, or even in the post-Kaleckian model *à la* Bhaduri and Marglin (1990), there is, thus, nothing that will bring back the actual rate of capacity utilization towards its normal value. A number of heterodox economists have expressed their annoyance at this feature of the standard neo-Kaleckian model. This criticism was made early on by Marco Committeri (1986), and it has been repeated more recently, for instance by Skott (2012), Duménil and Lévy (2014) and Cesaratto (2015). In the view of all these authors, a long-run equilibrium requires that the actual rate of utilization gravitates around the normal rate or converges towards it. They argue, as does Skott (1989, p. 70), that 'steady growth . . . is inconceivable unless the rate of capital utilisation is at the desired level'. Students of system dynamics would argue that a model without such a convergence towards the normal rate of capacity utilization would be exhibiting a missing feedback mechanism.

Several answers have been provided in response to this conundrum (Hein *et al*., 2012; Lavoie, 2014, pp. 387–410). One broad group of answer has been to deny the relevance of this critique, for instance by arguing that neo-Kaleckian authors never had a long-run steady state in mind, thinking rather in terms of a medium-run analysis, as does Hein (2014) explicitly for instance, where the economy is exposed to all kinds of shocks and where all possible adjustments are never completed (Chick and Caserta, 1997). In other words, there is 'no such thing as a long-run equilibrium in which all relevant adjustments have been completed' (Dutt, 2011, p. 380), so that only the average of short-run positions should be of concern. As Dutt (1997, p. 450) also points out, 'long-run equilibria in these models are theoretical constructs which depict a state which is maintained *if all parameters and functions of the model are taken as given*'. But in reality they are not given. A related group of answer has been that most of the early neo-Kaleckian models, such as those of Rowthorn (1981), Taylor (1983) and Dutt (1984) did not even refer to a normal rate of utilization, presumably on the ground that although firms may have some desired rate of capacity utilization, they may be content with the actual rate as long as this rate remains within a fairly large band around the normal rate. A third answer has been that the normal rate of utilization may itself be endogenous and possibly attracted by the actual rate of capacity utilization—a form of hysteresis.[1] Finally, a fourth answer has been that many of the mechanisms pertaining to drive the actual rate of capacity utilization towards its normal value have not been entirely convincing, or that small amendments to these mechanisms have resulted in the failure to achieve convergence to normal capacity utilization, as in Dutt (2011) for instance.

Still, given all that has been said in the above paragraph, the present article starts by granting that there exists a normal or desired rate of capacity utilization, one that is exogenous, and it undertakes to find a plausible set

[1] A similar instance is provided by Skott (2005) when he argues that wage norms held by workers may be influenced by the real wages that have actually been achieved in the labour market.

of mechanisms that can lead to convergence towards this normal rate while at the same time verifying whether some of the insights of the neo-Kaleckian model, like wage-led growth or the paradoxes of costs and of thrift, can be kept. The mechanism that we propose to investigate is the one put forward by Franklin Serrano (1995a, 1995b) under the name of the Sraffian supermultiplier. His intent is to show that Keynesian results will still hold despite the actual rate of capacity utilization being brought back to its normal level in the long run. We will examine whether this can be corroborated within the confines of a modified neo-Kaleckian model.

2.2 The short-run model with the Serrano proposal

As is well-known, the canonical neo-Kaleckian model of growth and distribution is made up of three equations: an investment equation, a saving equation and an equation defining income distribution. With respect to the last equation, we shall simply assume that income distribution does not change and is proxied by the share of profit, π. We start by using the simplest investment equation that will allow us to take into account the normal rate of capacity utilization, as first proposed by Edward Amadeo (1986). This is equation (1) below, which makes an explicit reference to a normal rate of utilization or to a 'planned' degree of utilization of capacity as Joseph Steindl (1952, p. 129) calls it. This normal rate is below unity, for instance it could be at 80 per cent. This investment function g^i, which is the rate of accumulation of capital K, is based on the distinction between undesired and desired excess capacity, or between the actual rate and the normal rate of capacity utilization, respectively, denoted by $u = Y/Y_{fc}$ and u_n, where Y and Y_{fc} are output and full-capacity output:

$$g^i = I/K = \gamma + \gamma_u(u - u_n) \tag{1}$$

It is obvious from the above equation that if the actual rate of utilization turned out to be equal to the normal or desired rate, the actual rate of growth would be equal to γ. As Committeri (1986, p. 173) and Caserta (1990, p. 152) point out, if firms are content about the degree of capacity utilization that is being achieved and do not desire to have it changed, one concludes that the rate of accumulation desired by firms should be equal to the expected growth rate of sales, or perhaps more appropriately, equal to some secular growth rate of sales. It is clear from equation (1) that the exogenous parameter γ then represents this expected or trend growth rate of sales.[2] If it is assumed that the actual rate of capacity utilization u is larger than the planned rate u_n, the actual rate of growth g must be larger than the expected growth rate of sales γ.

We now come to the saving equation. The crucial point made by Serrano (1995b) is that the *average* propensity to save will move endogenously when there are autonomous consumption expenditures, even if both the *marginal* propensity to save and the profit share are constant. This will be the case both in the short run, when autonomous consumption is a given, and in the medium run when growth occurs, with autonomous consumption growing at some given rate, different from the rate of accumulation. The simplest way to put this is to write the saving equation g^s:

$$g^s = S/K = (s_p \pi u/v) - z \tag{2}$$

with $z = Z/K$, where Z are the autonomous consumption expenditures of the capitalists, and hence where z is the ratio of autonomous expenditures to the capital stock. As usual, s_p is the (marginal) propensity to save out of profits, π is the profit share and v is the capital to output-capacity ratio, which will be assumed constant throughout. As is often assumed in this literature, there is no saving out of wages.

The main point that Serrano wishes to make is that saving (or the saving share of GDP) can adjust to investment (or the investment share of GDP) even when assuming that the marginal propensity to save, income distribution and the rate of utilization are all constant. The argument is, thus, that the 'Keynesian Hypothesis' is more general than previously thought, since it does not need to rely on an endogenous rate of utilization in the long run, in contrast to the neo-Kaleckian approach, or on an endogenous profit share, as in the earlier Kaldor-Robinson growth models. What happens is that even if s_p and π, as well as u are constant, the average propensity to save will be endogenous as long as z is itself endogenous. This average propensity to save out of national income Y can be derived from equation (2) and is equal to:

$$S/Y = s_p \pi - zv/u \tag{2$'$}$$

[2] Equation (1) is obviously a highly stylized representation of investment decisions. It ignores other key determinants of investment such as technological change, the profit rate or the profit share, credit or monetary conditions, the leverage ratio of firms, radical uncertainty and so on. Indeed Amadeo (1986) initially associated the constant γ with animal spirits, and hence we could possibly link the parameter γ to all the factors just mentioned.

Putting together equations (1) and (2) and solving for u, nothing special happens and all the standard neo-Kaleckian results, such as the paradoxes of thrift and of costs, still hold. An increase in the propensity to save s_p or in the profit share π leads to a fall in the rate of utilization u. This is obvious from looking at the short-run solution for the rate of utilization, when the ratio z has not had time to change:

$$u^* = \frac{(\gamma - \gamma_u u_n + z)v}{s_p \pi - v\gamma_u} \tag{3}$$

As is usual in the neo-Kaleckian model, we assume Keynesian stability, that is, we assume that saving reacts more than investment to a change in capacity utilization, that is, $s_p\pi/v > \gamma_u$, and hence we assume that the denominator of equation (3) is positive.

2.3 The medium run with the Serrano proposal

Let us now consider a longer run. The key idea here is that autonomous consumption expenditures grow at a certain rate g_z, which we assume to be given by outside circumstances. As Serrano (1995a, p. 84), puts it, it is usually assumed that autonomous components of aggregate demand grow in line with the capital stock, but 'it seems that it is rather the size of the economy itself that depends partially on the magnitude (and rates of growth) of these autonomous components of final demand'.

But assuming that Z grows at the constant rate g_z means that the ratio $z = Z/K$ must be changing through time, through the following law of motion that defines the growth rate of z:

$$\hat{z} = \frac{\dot{z}}{z} = \hat{Z} - \hat{K} = \bar{g}_z - g = (\bar{g}_z - \gamma) - \gamma_u(u^* - u_n) \tag{4}$$

The last equality is derived from the investment equation, $g^i = \gamma + \gamma_u(u - u_n)$. The bar over g_z is there to recall that the growth rate of autonomous expenditures is an unexplained constant. What we wish to know is whether the behaviour of z is dynamically stable or not, that is, whether it will converge to a stable value. This will happen if $d\hat{z}/dz$ is smaller than zero. Making use of equation (3), we can compute what the term $(u^* - u_n)$ is equal to:

$$u^* - u_n = \frac{(\gamma + z)v - s_p \pi u_n}{s_p \pi - v\gamma_u} \tag{5}$$

Combining equations (4) and (5) we get:

$$\hat{z} = (\bar{g}_z - \gamma) - \gamma_u \left[\frac{(\gamma + z)v - s_p \pi u_n}{s_p \pi - v\gamma_u} \right] \tag{6}$$

And, thus, taking the derivative of $\hat{z}$ with respect to itself, we find that:

$$\frac{d\hat{z}}{dz} = \frac{-\gamma_u v}{s_p \pi - v\gamma_u} < 0 \tag{7}$$

The derivative is always negative, as long as the denominator is positive, that is, as long as there is short-run Keynesian stability. This means that z will converge to an equilibrium value z^{**}, at which value the growth rates of capital and aggregate demand will be the same as the given growth rate of autonomous consumption expenditures. This also means that the medium-run solutions that one could find, by assuming that at some point the growth rate of capital equates the growth rate of autonomous consumption, will indeed be realized if given enough time. The model is dynamically stable.

What is the intuitive understanding of the stability condition? A rise in z increases aggregate consumption and therefore the rate of capacity utilization (as can be seen from equation (3)). This brings about an increase in the rate of capital accumulation through the investment equation (1). Since the growth rate of autonomous consumption is fixed, the growth rate of the ratio z of autonomous consumption to capital falls.

In this medium run, $g^{**} = \bar{g}_z$, and hence making use first of the investment equation, and then of the saving equation, we can derive the two medium-run equilibria:

$$u^{**} = u_n + \frac{\bar{g}_z - \gamma}{\gamma_u} \tag{8}$$

$$z^{**} = \frac{s_p \pi u^{**}}{v} - \bar{g}_z \tag{9}$$

Obviously, if s_p or π are larger, z^{**} (the medium-run size of autonomous consumption relative to capital) will be larger, but these two parameters have no effect on u^{**}; and if $\bar{g}_z$ is larger, u^{**} will be larger. Thus, for given parameter values, $\bar{g}_z$ cannot be too large, otherwise the rate of capacity utilization would need to exceed unity, meaning that if one believes that this condition is binding, then one needs $\bar{g}_z \leq \gamma + \gamma_u(1 - u_n)$.

Furthermore, what is the effect of $\bar{g}_z$ on z^{**}? To find out, one has to combine equations (8) and (9), so as to obtain:

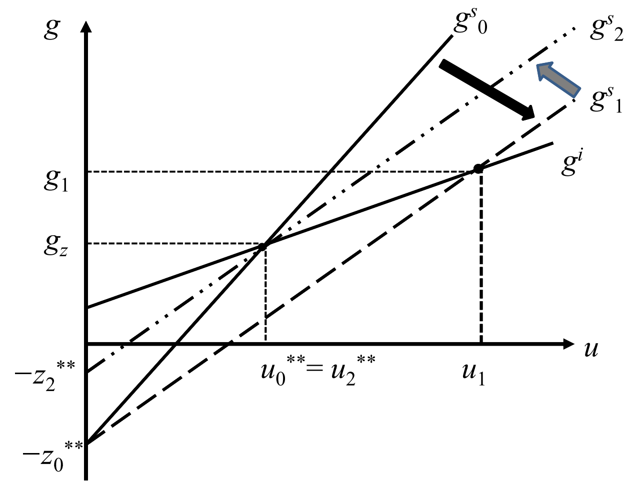

Figure 1. The impact of a decrease in the profit share or in the marginal propensity to save out of profits with the Serrano adjustment mechanism.

$$z^{**} = \frac{s_p\pi(\gamma_u u_n - \gamma) + (s_p\pi - v\gamma_u)\bar{g}_z}{v\gamma_u} \tag{9'}$$

Taking the derivative of equation (9′) with respect to $\bar{g}_z$ we get:

$$\frac{dz^{**}}{d\bar{g}_z} = \frac{s_p\pi - \gamma_u v}{v\gamma_u} \tag{9''}$$

The derivative is positive provided $s_p\pi > v\gamma_u$, that is, provided there is short-run Keynesian stability, which was already assumed. Thus, as long as there is Keynesian stability, an increase in the growth rate of autonomous consumption expenditure will lead to an increase in the medium-run ratio z^{**} of autonomous consumption expenditure to capital.

2.4 A graphical interpretation of the Serrano mechanism

The Serrano adjustment mechanism can be illustrated with the help of figure 1. Let us assume that the economy starts from a steady state where the rate of accumulation is exactly equal to the growth rate of autonomous consumption expenditures, with a rate of utilization of u_0^{**}. Let us now suppose that there is a decrease in the marginal propensity to save out of profits or in the share of profits. This will be associated with a rotation of the saving curve, from g_0^s to g_1^s,

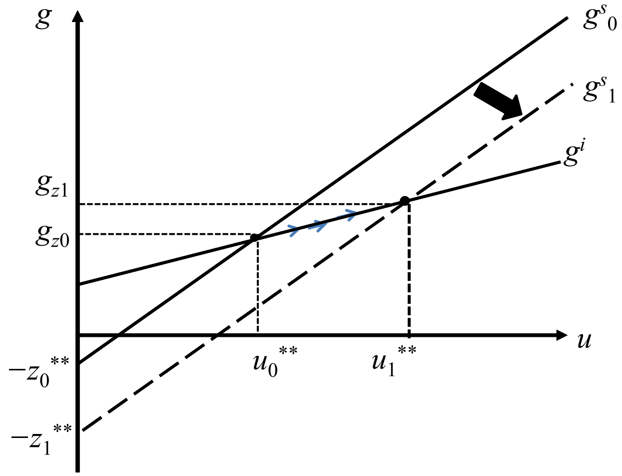

Figure 2. The impact of an increase in the growth rate of autonomous consumption expenditures in a neo-Kaleckian model.

as shown with the help of the black arrow, since the slope of the curve will now be smaller. In the short run, as in all Kaleckian models, this will generate an increase in the growth rate of capital and in the rate of utilization, which move to g_1 and u_1 in the short run. But the new equilibrium is only a temporary one, as the new discrepancy between g_1 and g_z will generate a reduction in z through equation (4). The saving curve will, thus, gradually shift up through time, as shown in figure 1 with the help of the grey arrow, until the saving curve reaches g^s_2, at which point the rate of accumulation equates the given growth rate of autonomous consumption. As to the rate of utilization, it will be back to its initial equilibrium position, such that $u_2^{**} = u_0^{**}$. The change in income distribution or in the marginal propensity to save has had no impact on the equilibrium rate of utilization. However, the *average* rate of utilization and the *average* rate of growth achieved during this whole episode are higher, the economy having been run between u_0^{**} and u_1 and g_z and g_1, respectively, during the whole transition. As a consequence, *at any point of time during the traverse*, the level of output and of capacity will be higher than if there had been no increase in real wages or no decrease in the marginal propensity to save.

Figure 2 illustrates what happens when there is an increase in the growth rate of autonomous consumption expenditures. As is clear from equation (4), this will generate an increase in the value of z, the ratio of autonomous consumption expenditures to capital. This increase will keep on going until the increase in the short-run equilibrium value of u* is sufficiently high to compensate the effect of the higher autonomous growth rate g_z, at which point the traverse will end. As is clear from figure 2, a higher growth rate of autonomous consumption expenditure will generate a larger value of z^{**} (as seen with the help of equation (9″) and a higher value of capacity utilization u^{**} (see equation (8)). Thus, the model is clearly Keynesian. Faster autonomous growth generates rates of capital accumulation and rates of capacity utilization that become progressively larger, until finally the stock of capital grows at as high a rate as that of autonomous consumption expenditures, at which point the rate of utilization takes a steady value.

2.5 Discussion of the Serrano mechanism

At this stage, five remarks can be made. First, the mechanism designed by Serrano on its own does not achieve a normal rate of capacity utilization, since $u^{**} \neq u_n$.[3] For $u^{**} = u_n$ to be achieved, the γ parameter in the investment equation would need to equal g_z. In other words, entrepreneurs would need to assess the trend growth rate of sales as being equal to the growth rate of autonomous consumption expenditures. This was recognized by supporters of the supermutiplier, who used to refer to perfect foresight or to correct forward-looking expectations, without providing any further mechanisms or explanations.

Second, almost by definition, with this mechanism, we can have neither a wage-led nor a profit-led regime, as they are defined in the literature related to the post-Kaleckian growth model, since the growth rates of capital and of output eventually adjust to the given growth rate of autonomous consumption expenditures, and also because the long-run value of the rate of utilization u^{**} depends neither on the profit share nor on the marginal propensity to save out of profits. As long as there is no change to any of the four parameters in equation (8), any change in the profit share or in the marginal propensity to save will have no effect on the medium-run value of the rate of utilization.[4] Thus, looking at the rate of capacity utilization

[3] A similar result is obtained by Freitas and Serrano (2013) and Serrano and Freitas (2015) when the accelerator in their model is not flexible and, thus, does not react to the discrepancy between the realized and the normal rate of utilization.

[4] Pariboni (2015) shows that if the standard neo-Kaleckian investment equation, given by equation (1), is replaced by the investment equation proposed by Bhaduri and Marglin (1990) in what is now often referred to as the post-Kaleckian model, where investment depends on the rate of utilization and the profit share, the medium-run equilibrium u^{**} equivalent to equation (8) will be a negative function of the profit share, thus, showing that even the post-Kaleckian model is subjected to wage-led forces when autonomous consumption expenditures are taken into account.

achieved in the new steady states, we could say that the paradoxes of thrift and of costs no longer exist.

This leads, however, to a third remark. While the paradox of thrift and of costs are gone in the medium-run version of this model (looking at steady-state growth rates), reducing the profit share or reducing the marginal propensity to save out of profits will have a positive effect on the *levels* of capital, capacity and output.[5] This is a point that Sergio Cesaratto (2015) has emphasized recently, and it is precisely the point made originally by Serrano:

> That lower marginal propensity to save will increase the level of induced consumption and aggregate demand, and, consequently, also the long-period level of productive capacity. However, this will be a once-and-for-all effect. Once capacity has adjusted to the new (higher) level of effective demand implied by the higher (super) multiplier, the economy will settle back to steady growth at the unchanged rate given by the growth of autonomous expenditures. Therefore, on the demand side, a decrease in the marginal propensity to save brought about by the rise of the real wage will have a positive long-period level effect (on capacity output), but will have no effect on the sustainable secular rate of growth of capacity.
>
> Serrano, 1995b, p. 138.

A fourth remark is now in order. By a strange turn of events, whereas Sraffians are usually accused by other post-Keynesians of focusing on fully adjusted positions (with normal prices and normal rates of capacity utilization, as defined by Vianello (1985)), several Sraffian authors have criticized Kaleckians for focusing unduly on steady states, arguing that steady-state analysis ought to be jettisoned (Trezzini, 2011b, p. 143). In the example provided above by Serrano and in our little model, while the rate of capacity utilization would be the same at the beginning and at the end of the process, it will be higher during the transition process. Thus, on *average*, the rate of utilization and the growth rate of the economy are higher than at the starting and terminal points of the traverse. Thus, what these Sraffians are telling us is that more attention should be paid to the average values achieved during the *traverse* than to the terminal points. This is a

[5] Allain (2015, p. 1362) provides a graphical illustration of this feature, with a figure showing the evolution of the log of GDP through time, showing that an increase in the profit share in a model with autonomous government expenditure will lead to a temporary slowdown of GDP growth, which will eventually recover its initial value. GDP levels, however, will be forever lower than they would have been if there had been no change in the profit share.

recommendation with which all post-Keynesians could certainly agree (see for instance Jacques Henry, 1987), and it is one which is made quite explicitly by Man-Seop Park (1995, p. 307), who argued that the moving averages of key variables are quite distinct from their potential steady-state values, a point which was perhaps not fully appreciated when it was made.

As a fifth remark, we may say that, as a follow-up to a positive shock on aggregate demand, a *transient* higher rate of utilization, rather than a *permanent* higher rate of utilization, seems to provide a better fit to the existing data on rates of utilization. It has been argued by a number of authors that despite large short-run fluctuations of the rate of capacity utilization, the long-run variations are relatively limited, with a tendency to return towards its mean, which the critics of the neo-Kaleckian growth model interpret as being the normal rate of capacity utilization (Skott, 2012; Dejuán, 2013; Duménil and Lévy, 2014). Thus, the neo-Kaleckian model modified by the addition of autonomous consumption expenditures allows the model to be reconciled with this apparent empirical behaviour of the rate of capacity utilization.

3. THE COMPLEX VARIANT OF THE NEO-KALECKIAN MODEL, WITH A HARRODIAN MECHANISM

So far, we have shown that Serrano's autonomous consumption expenditure growing at a constant rate provides a mechanism that achieves convergence to a constant rate of capacity utilization, but that rate is generally *not* the normal rate of utilization, which justifies our use of a medium-run equilibrium in contrast to a long-run one. As pointe out in the previous section, the critics of neo-Kaleckian models complain that these models incorporate no mechanism driving the economy towards the *normal* rate of capacity utilization. Thus, we need to consider an additional mechanism to achieve the normal rate of utilization that Serrano and the critics are longing for. Allain (2015) has proposed the addition of such a mechanism—a Harrodian one. Thus, it will turn out that combining a Harrodian investment equation with Serrano's autonomous consumption expenditure will provide a response to those who believe that there are Harrodian instability mechanisms at work in capitalist economies as well as those who argue that the economy should gravitate around or converge towards a normal rate of capacity utilization.

For simplification purposes, we propose a slightly modified version of the standard Harrodian equation. Here, we assume that it is the *rate of change*, rather than the change, in the γ parameter of the investment function which responds to discrepancies between observed growth rates and expected trends. Thus, the γ parameter reacts to a discrepancy between the actual rate of accumulation g^* and the expected secular growth rate of sales γ, as was suggested in Lavoie (1996, p. 139) and then by Allain (2015):

$$\hat{\gamma}=\mu(g^*-\gamma),\ \mu>0 \tag{10}$$

Taking into account the investment function given by equation (1), equation (10) can be rewritten as a function of the rate of utilization, thus, getting another standard version of the Harrodian mechanism:

$$\hat{\gamma}=\mu\gamma_u(u^*-u_n),\ \mu>0 \tag{11}$$

Making use of equation (5) once again, the Harrodian equation becomes:

$$\hat{\gamma}=\mu\gamma_u\left(\frac{(\gamma+z)v-s_p\pi u_n}{s_p\pi-v\gamma_u}\right) \tag{12}$$

We thus have a new system of simultaneous dynamic equations, given by equations (6) and (12). To find how the system behaves, we need to consider the following 2 × 2 Jacobian matrix, called J:

$$J=\begin{pmatrix} \dfrac{\mu\gamma_u v}{s_p\pi-v\gamma_u} & \dfrac{\mu\gamma_u v}{s_p\pi-v\gamma_u} \\ -\left(1+\dfrac{v\gamma_u}{s_p\pi-v\gamma_u}\right) & \dfrac{-\gamma_u v}{s_p\pi-v\gamma_u} \end{pmatrix} \tag{13}$$

For the system characterized by the Jacobian (13) to exhibit stability and to converge to an equilibrium, given by the doublet $\bar{g}_z$ and u_n, the determinant needs to be positive and the trace needs to be negative. To find how the system described by (13) behaves, we need to look at the determinant of the 2 × 2 Jacobian matrix, and at its trace. For the system to exhibit stability and to converge to an equilibrium given by the doublet g_z and u_n, the determinant needs to be positive and the trace needs to be negative. We get:

$$\text{Det}\,J=\frac{\mu\gamma_u v}{s_p\pi-v\gamma_u}$$

$$\text{Tr}\,J=-\frac{\gamma_u(1-\mu)v}{s_p\pi-v\gamma_u}$$

The determinant is positive whenever the Keynesian stability condition is fulfilled. Given this short-run stability condition, the trace is negative if

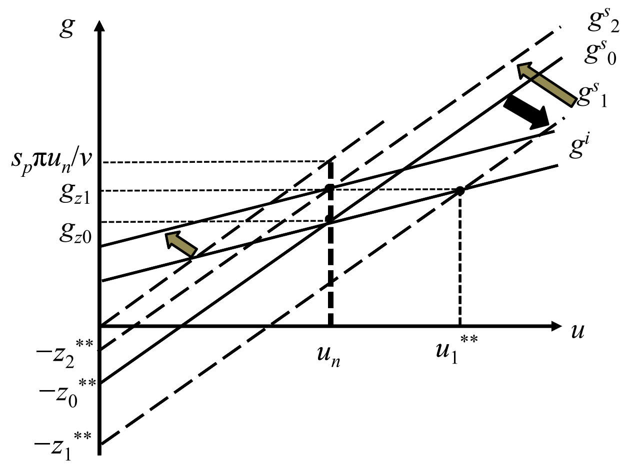

Figure 3. The impact of an increase in the growth rate of autonomous consumption expenditures in a neo-Kaleckian model with the addition of a Harrodian mechanism.

$\mu < 1$. Thus, the system is dynamically stable when there is short-run Keynesian stability as long as the effect of Harrodian instability is not overly strong.[6] If this is so, depending on the values taken by the parameters, this system may come back straight to its fully adjusted position, where $u^{**} = u_n$ and where $g^{**} = \gamma^{**} = \bar{g}_z$, or it may whirl cyclically towards it.

3.1 A first graphical illustration

Figure 3 illustrates what goes on when, once more, we examine the case of an increase in the growth rate of autonomous consumption expenditures, from g_{z0} to g_{z1}. We suppose that the economy starts from a fully adjusted position at u_n, with the saving curve being given by g_0^s and the ratio of autonomous expenditure to the capital stock being set at z_0^{**}. Assuming here that the Harrodian mechanism is a process that takes time to get going, the economy first moves towards the rate of utilization $u_1{}^{**}$, with

[6] While the condition $\mu < 1$ may look fairly innocuous, Olivier Allain has pointed out to me that equation (10) on its own severely restrains the strength of the Harrodian mechanism. For instance, with $\mu = 1$, and with the expected growth rate of sales γ at 3 per cent and the actual growth rate g^* at 4 per cent, the new expected growth rate of sales would only move up to 3.03 per cent. The condition $\mu < 1$, thus, implies a fairly slow convergence to the normal rate of utilization.

the share of autonomous consumption expenditures rising towards z_1** as indicated by the black arrow, just as it did in figure 2, but here without actually getting there. This is because the Harrodian mechanism eventually kicks in, generating an increase in the expected secular growth rate of sales γ, so that the investment function g^i commences to shift upwards. As it does, driving up further the rate of capacity of utilization in the process, the growth rate of capital eventually exceeds the growth rate of autonomous expenditures. This will put the Serrano mechanism in reverse gear, with the share of autonomous consumption expenditures relative to the stock of capital now declining, as shown by the slim grey arrows. Provided its strength is not excessive, the Harrodian mechanism eventually brings back the economy towards the normal rate of capacity utilization u_n, with the share of autonomous expenditures eventually declining all the way to z_2**. This corresponds to the value given by equation (9) with $u^{**} = u_n$ and to the value given by equation ((9)') when $\bar{g}_z = \gamma$. Meanwhile, the increase in the rate of capital accumulation will be restrained by the Serrano mechanism, as it will be driven back towards the new rate of growth of the autonomous consumption expenditures, so that $g^{**} = g_{z1}$.

Figure 3 helps to understand the existence of a maximum value for the autonomous growth rate $\bar{g}_z$, for if the restriction given by inequality (14) were not to be respected, the new fully adjusted position could never be achieved, as this would require a negative amount of autonomous consumption expenditure.

$$\bar{g}_z < s_p \pi u_n / v \tag{14}$$

3.2 A phase diagram analysis

We may also examine the system of simultaneous dynamic equations with the help of a phase diagram in the z and γ space. First, from equation (12), we derive the first demarcation line where $\hat{\gamma}=0$. This will occur when:

$$\gamma = -z + \frac{s_p \pi u_n}{v} \tag{15}$$

And from equation (6) we derive the second demarcation line where $\hat{z}=0$. This will occur when:

$$\gamma = -\frac{\gamma_u v}{s_p \pi} z + \frac{\bar{g}_z \left(s_p \pi - v \gamma_u\right) + s_p \pi \gamma_u u_n}{s_p \pi} \tag{16}$$

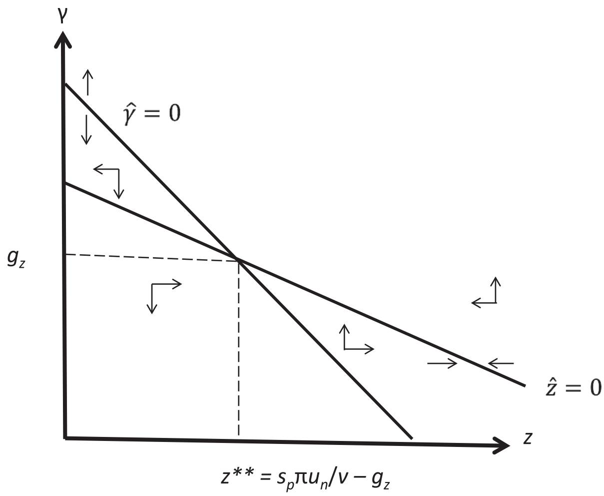

Figure 4. The two demarcation lines tied to the share of autonomous consumption expenditures and the expected secular growth rate of sales.

or

$$\gamma = -\frac{\gamma_u v}{s_p \pi} z + \bar{g}_z \left[1 - \left(v\gamma_u / s_p \pi\right)\right] + \gamma_u u_n \tag{16$'$}$$

The slope of the $\hat{\gamma}=0$ demarcation line is, thus, -1. As to the slope of the $\hat{z}=0$ demarcation line, we know that it is flatter than the first one, because the absolute value of the slope is smaller than 1, as long as we keep assuming the Keynesian short-run stability condition ($s_p\pi > v\gamma_u$). It can be shown that the intercept of the $\hat{z}=0$ demarcation line with the vertical axis is smaller than that of the $\hat{\gamma}=0$ demarcation line, as it should be for the two demarcation lines to cross each other, provided the condition $\bar{g}_z < s_p\pi u_n/v$ holds, as already pointed out with equation (14). The phase diagram with its streamlines is shown in figure 4. The long-run equilibrium is found at the intersection of the two demarcation lines, where $\gamma^{**} = \bar{g}_z$ and where $z^{**} = s_p\pi u_n/v - \bar{g}_z$. The dynamics of γ are destabilizing around the stationary locus while those of z are stabilizing. The cycles will be making the economy go to the long-run equilibrium if the vertical dis-equilibrating movements due to changes in γ are damper than the horizontal equilibrating movements due to changes in the autonomous consumption expenditure to capital stock ratio z.

Next, we examine what happens if there is an increase in the growth rate of the autonomous consumption expenditures. This is done with the help

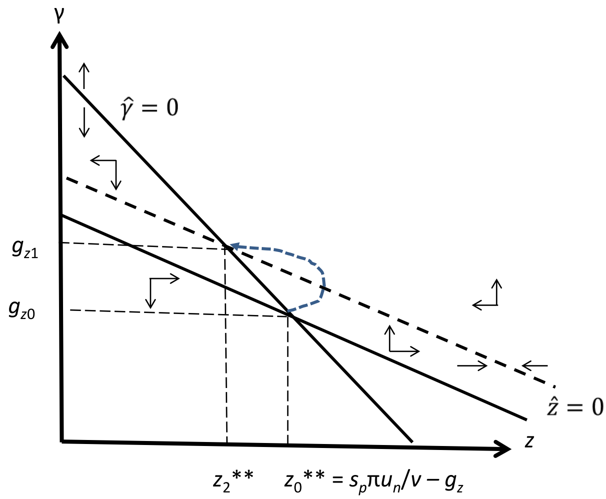

Figure 5. Phase diagram with an increase in the growth rate of autonomous consumption expenditures.

of figure 5. Figure 5 is the phase diagram equivalent of figure 3.The two continuous demarcation lines represent the starting position, assumed to be a long-run equilibrium with z_0^{**} and where $\gamma^{**} = \bar{g}_{z0}$ and $u^{**} = u_n$. As can be verified from equations (15) and (16), the increase in $\bar{g}_z$ has no effect on the $\hat{\gamma}=0$ demarcation line, but it leads to an upward parallel shift in the $\hat{z}=0$ demarcation line, which is now given by the dotted demarcation line. The case illustrated here is one where the new long-run equilibrium is quickly achieved. As in figure 3, the faster growth rate of autonomous consumption expenditure initially leads to a higher z ratio, but the increase in the rate of utilization due to the increase in autonomous expenditures, as well as the increase in the γ parameter due to the Harrodian mechanism induce an even faster growth rate of capacity, which in the following stage causes a reduction in the autonomous consumption expenditure to capital stock ratio z, thus, eventually bringing back the rate of utilization towards its normal level, and, thus, achieving a new long-run equilibrium with z_2^{**} and where income, capital and capacity all grow at the new growth rate $\bar{g}_{z1}$. Thus, despite the return towards the normal degree of capacity utilization, the model generates a Keynesian result.

But what happens if there is a decrease in the marginal propensity to save out of profits, given by s_p, or if there is a decrease in the profit share? In the simple modification of the Kaleckian model that only incorporated the Serrano mechanism, as illustrated by figure 1, the answer was fairly straightforward: since the rate of capacity utilization and the rate of accumulation were higher during the whole traverse than they would have been without the change, we could safely conclude that the paradox of thrift and the paradox of costs still held, provided they were interpreted in terms of level effects, or as average growth rates over the duration of the traverse. But what can be said once the Harrodian mechanism is added to the model?

Figure 6 provides a phase diagram of what can happen with a decrease in the profit share or in the marginal propensity to save out of profits, assuming as before dynamic stability. Both demarcation lines shift down, as shown by the new dotted demarcation lines. Because there is no change in the rate of growth of autonomous expenditures, the new long-run equilibrium value of γ is no different from what it was originally, as is shown in figure 6. With cycles around the long-run equilibrium, there will also be phases when the economy will have lower rates of capacity utilization and growth than the long-run equilibrium values. The claim that the average growth rate over the duration of the traverse is higher with an increase in the wage share or a fall in the marginal propensity to save is, thus, not as obvious as it was when only the Serrano mechanism played a role.

Still, we can say the following. First, the fall in the profit share or in the marginal propensity to save right away will increase the rate of capacity utilization and the rate of accumulation, which will also induce an increase in the γ parameter. This gives a clear upward bias to the growth rate. Second, as long as symmetric adjustments are assumed above and below the demarcation lines (that is, the value of μ is assumed constant), the upward movements will dominate the downward movements. These two points together insure that the reduction in the profit share or in the marginal propensity to save will generate an average growth rate that will be higher over the duration of the traverse than its starting value, despite the actual rate of capacity utilization being brought back to its normal level. Naturally, if there are asymmetrical adjustments, with slumps being stronger and deeper than expansion, this result may not hold.

4. DISCUSSION OF SOME OF THE RELATED LITERATURE

As pointed out earlier, the work of Serrano (1995a, 1995b), with the introduction of his autonomous consumption expenditures, is at the core of the present article. The model proposed here is, however, closest to the model and the mechanisms found in the article of Olivier Allain (2015), which was first presented at a conference in 2012. Indeed, Allain's model was the inspiration for this article. The present model and Allain's model both start with a neo-

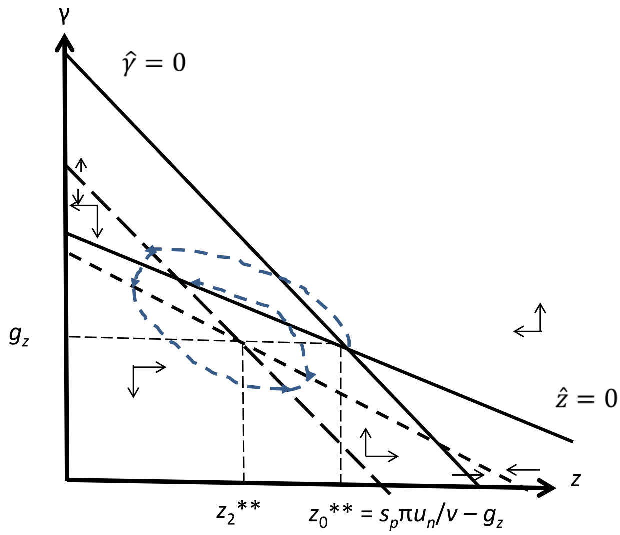

Figure 6. Phase diagram with a decrease in the profit share or in the marginal propensity to save out of profits.

Kaleckian framework, with an identical investment equation and a (nearly) identical Harrodian mechanism. The key difference is that Allain assumes that government expenditure grows at a constant rate and, thus, plays the role of the autonomous non-capacity creating expenditure, with the ratio of government expenditure to capital playing the role of the stabilizing factor—the z variable in the present model. To avoid discussing the expansionary effects of a budget deficit and the dynamics related to debt, Allain (2015) assumes that the tax rate on income is endogenous and set to keep the budget in balance. The average propensity to save, thus, becomes a function of the tax rate and hence a function of the relative size of the autonomous government expenditure. Allain's model arrives at essentially the same results regarding growth and level effects of a change in the autonomous growth rate or of a change in the propensity to save and the profit share. Allain finds a conditional convergence towards a long-run equilibrium with a normal rate of capacity utilization. His dynamic stability condition is very similar to the one found here. Using our notation, his condition for the equilibrium to be locally stable is such that $\mu < s_p\pi u_n/v - g_z$.[7]

[7] Allain's Harrodian equation is $\dot{\gamma} = \mu\gamma_u(u^* - u_n)$. Compare with equation (11). As pointed out by one of the referees, if I had made use of Allain's Harrodian equation, based on the *change* in the γ parameter, I would have found exactly the same condition to achieve local dynamic stability.

What about Serrano's own argument, that of the so-called Sraffian supermultiplier? There are two Sraffian positions on this issue. There are those Sraffians who have supported the analysis of the supermultiplier with its normal rate of capacity utilization, such as Heinrich Bortis (1997), Sergio Cesaratto (2015) and Oscar Dejuán (2005, 2013); and there are those like Man-Seop Park (2000), Attilio Trezzini (1995, 1998) and Palumbo and Trezzini (2003), as well as Nelson Barbosa-Filho (2000) and Moudud (2010, pp. 71–2), who have questioned the stability of the mechanism being contemplated implicitly by Serrano or who complain that he is just assuming the existence of an equilibrium at normal capacity utilization.

Indeed, Serrano (1995a, 1995b) did not present a stability analysis. This explains why his argument based on the growth rate of non-capacity creating autonomous expenditures and the endogenous average saving rate has not been more generally endorsed by other post-Keynesians or utilized in their own models. This is because, as recalled by Joseph Halevi and Peter Kriesler (1991, p. 86), to entertain the study of fully adjusted positions, one must be able to provide a 'coherent adjustment process'. Serrano could only argue at the time that as long as demand expectations by entrepreneurs are not systematically biased, the average rate of capacity utilization will tend towards the normal rate of utilization and hence that the economy will tend towards a fully adjusted position.[8]

By contrast Serrano's critics, listed above, argued that if the economy starts from a fully adjusted position, it is unlikely to remain there; and when the economy gets away from a fully adjusted position, it is unlikely to come back to it; in other words, the equilibrium at the normal rate of capacity utilization is not stable. Here we will not discuss these objections much longer as they are being scrutinized and dismissed as a misunderstanding of Serrano's initial argument by Freitas and Serrano (2013, 2015) and Serrano and Freitas (2015). For instance, Palumbo and Trezzini (2003, p. 116) would seem to agree with Freitas and Serrano when they write that 'utilization must necessarily be different from normal *on average*' and when they add that 'coincidence of demand (output) and capacity cannot be assumed either as a continuous condition ... or as an average condition'. This is exactly what has been shown in the present model: the actual rate of utilization is not continually at the normal rate of utilization, nor is it there on average; it only tends conditionally towards the normal rate. And this is also what happens in the stability analysis provided by Freitas and Serrano (2013, 2015) and Serrano and Freitas (2015).

[8] The same can be said about Bortis (1997).

These two authors assume that investment I is a fraction of income, so that $I = hY$ where h is the accelerator, but where h also happens to be the share of investment in GDP, I/Y. Dividing by K, we can rewrite this as $I/K = g^i = (I/Y)(Y/K)(Y/Y_{fc}) = (h/v)u$. In our notations, $h/v = \gamma_u$. They then assume a Harrodian adjustment mechanism similar to the one given here by equation (10), such that $\hat{h} = \mu(u - u_n)$, implying that investment takes an ever larger share of GDP as long as the actual rate of capacity utilization surpasses its normal level, thus, adopting a flexible accelerator.[9] As is the case with the neo-Kaleckian model, the rate of utilization is determined by the equality between investment and saving, but with the marginal propensity to save out of profits being assumed to equal unity while workers save nothing.

With consumption by capitalists being autonomous and growing at the rate $\bar{g}_z$, Freitas and Serrano obtain a system of two first-order non-linear differential equations, with $\dot{u}$ and $\dot{h}$ being the dependent variables. As is the case here, for Serrano's mechanism to work out, the growth rate of autonomous expenditures cannot be too large, for otherwise the share of autonomous consumption expenditures would need to be negative. Freitas and Serrano, thus, require a restriction similar to that of equation (14). As is also the case in the present model, the determinant of the Jacobian of Freitas and Serrano's (2013) dynamic system is always positive and the trace is likely to be negative if the effect of Harrodian instability is not overly strong. Freitas and Serrano (2013, p. 21) show that in their model the trace is negative and hence the dynamic stability condition is fulfilled (given the restrictive condition noted above) if the *marginal propensity to spend* remains below one during the whole adjustment process. This implies that, as a proportion of output, induced consumption out of wages plus the induced investment expenditures, including those generated by the Harrodian mechanism, must be smaller than unity. Thus, although their analysis proceeds differently, there are close similarities between the requirements for the existence and stability of the solutions of Freitas and Serrano's model and the present neo-Kaleckian model. The implications of their model with regards to the favorable level effects of a decrease in the marginal propensity to save or in the profit share are identical to those presented here.

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[9] It may be worth noting that Shaikh (1991), in a paper that intended to show that Harrodian instability could be tamed, provides a convergence equation where the flexible accelerator h behaves exactly as assumed by Freitas and Serrano, while the role of the exogenous growth component is taken by investment in materials needed for the growth in future production (the warranted rate). Shaikh's proof certainly mesmerized most readers at the time.

5. SOME JUSTIFICATION FOR ADDING NON-CAPACITY CREATING AUTONOMOUS EXPENDITURES

In this section, I wish to offer some miscellaneous justifications for the introduction of non-capacity creating autonomous expenditures in a Kaleckian model. While Keynes though that investment was the exogenous driver of the economy, presumably because he thought that it was the most unstable macroeconomic variable, there is substantial evidence that investment may best be considered as an induced variable, as argued by Serrano (1995b). For instance, Christian Schoder (2014) has recently shown that production capacities adjust endogenously to changes in current output, whereas the reverse causality does not seem to occur. In addition, there is empirical evidence that some components of aggregate demand, beyond government expenditure or exports, can be considered as more autonomous than corporate investment, although, naturally, in the long run, one could argue that there is no truly exogenous variable.

A nice piece of evidence has recently been provided by Yi Wen (2007), on the basis of Granger-causality tests and more sophisticated econometrics. Looking more specifically at *business* investment, he finds that 'Postwar U.S. aggregate data exhibit a "causal" chain among consumption, output, and investment. That "causality" runs in only one direction: from consumption growth to output growth and from output growth to capital formation' (Wen, 2007, p. 199). Thus, consumption seems to Granger-cause business investment. This poses a challenge to both standard Keynesian/Kaleckian theory and New Classical theory, since the former usually takes business investment as the causal or exogenous element of its models while real-business cycle theories assume that changes in output growth are triggered by technological shocks. Wen (2007, p. 204) claims that this inversed causality is puzzling to economists but not to people immersed in business: 'According to a businessman's intuition, production would not rise until consumption demand rises; and investment would not rise until profit rises along with the rise in production'. Nor would this empirical result of reversed causality be surprising to Sraffians in the Serrano camp.

Wen's econometric results get substantial confirmation by the recent study of Brett Fiebiger (2014), who looks at the patterns that can be observed in U.S. postwar business cycles since 1951. He finds that growth in household residential investment and growth in household consumer credit are very closely associated with contemporaneous growth in business profits, with the correlation between these variables being positive, while the growth in business investment and the growth in business profits are negatively correlated. Business investment clearly appears as an induced expenditure, which reacts with a lag to changes in profits and in rates of capacity utilization. Fiebiger goes so far as to conclude that the U.S. demand regime is one led by 'semi-autonomous household expenditures'. This is confirmed by two well-known students of business cycles—Edward Leamer (2009) and Howard Sherman (2010)—according to both of whom, despite using quite different approaches, the real estate industry is the most important advanced indicator of economic activity.

Most recently this question has been picked up by two young Italian economists, Girardi and Pariboni (2015). In four large European countries and in the United States, they look at the relationship between output and variables that one can consider as autonomous expenditures or proxy for these: exports, government expenditure, residential construction and consumer credit. With a vector error-correction model (VECM) they show that in the United States, if one excludes consumer credit, these autonomous expenditures can be said to 'cause' output in a unidirectional way. With consumer credit, the causality goes both ways. They also examine the relationship between autonomous expenditures and the share of investment in output, for the United States and four European countries (France, Germany, Italy, Spain). Conducting Granger-causality tests they conclude that causality is unidirectional, and that an increase in the growth rate of autonomous expenditures leads to a rise in the share of investment in output, and, thus, to a relative acceleration in the rate of capital accumulation, as the models presented above have suggested. Once again, there is, thus, some evidence that these non-capacity creating autonomous (or semi-autonomous) expenditures are inducing business investment, rather than the opposite.

6. CONCLUSION

We, thus, have reached a conditional proof that neo-Kaleckian results such as the paradox of thrift or the paradox of costs can be preserved even if the economy systematically comes back towards a constant normal rate of utilization, as long as we interpret neo-Kaleckian results as averages measured during the period of transition. This is achieved by taking into account an autonomous growth component, here autonomous consumption expenditures, by assuming short-run Keynesian stability and by incorporating to the investment function a Harrodian correcting mechanism which is not overly strong.

By embedding into a neo-Kaleckian model a mechanism akin to that of the Sraffian supermultiplier model suggested by Serrano (1995b), the change in income distribution or in the marginal propensity to save has no impact on the long-run rate of capacity utilization which is not endogenous anymore, because it eventually comes back to its normal or target rate. However, with a lower profit margin or a lower marginal propensity to save out of profits, the *average* rate of utilization and the *average* rate of growth achieved during the *traverse* from the initial equilibrium towards the new steady-state equilibrium will both be higher, as is being claimed from canonical neo-Kaleckian models.[10] As a consequence, the *level* of output and of capacity at all times will be higher than if there had been no increase in real wages or no decrease in the marginal propensity to save. Indeed, (nearly all) empirical works about wage-led and profit-led regimes that derive from the post-Kaleckian growth model are in fact based on calculations of *level* effects, where the impact of a change in the profit share on the *level* of GDP is being assessed, as in Onaran and Galanis (2012, 2013) for instance.[11]

Other post-Keynesians, also assume that non-capacity creating autonomous expenditures are the driving force, rather than investment. Serrano himself refers to Kaldor (1983, p. 9) to provide support for this reversal of causality. Fazzari *et al*. (2013) assume that there is some unidentified demand component that grows autonomously, in order to tame Harrodian instability; Godley and Lavoie (2007, ch. 11) and, as already pointed out Allain (2015), rely on autonomous government expenditures. Indeed, there is a large Kaldorian literature that relies on exogenous growth components other than business investment, most particularly the whole literature on Thirlwall's law with its

[10] This is in clear contrast with the so-called classical-Marxian view, which, as recently recalled by Duménil and Lévy (2014, p. 1288), asserts that a decrease in the real wage will lead to an increase in the normal profit rate and hence to an increase in the growth rate of the economy. One of the referees has reminded me that Skott (1989, pp. 81–4) also discusses level effects. The framework is different, however: the desired rate of utilization and the profit share are endogenous variables, while stronger labour unions lead to reduced rates of employment.

[11] Log level values are being used in the regressions, which allow to construe the regression coefficients as elasticities. Other authors, such as Storm and Naastepad (2012), regress the growth rate of real wages on the growth rate of GDP, thus, also obtaining coefficients that are elasticities.

exogenous exports (McCombie and Thirlwall, 1994), as well as Godley and Cripps (1983), with both government expenditure and export sales.[12]

With the obvious role played by consumer credit in the recent Global Financial Crisis, there have been a number of papers assuming the presence of autonomous consumption expenditures, such as that of Trezzini (2011a). With consumer credit and lines of credit based on the value of real estate, it is clear that consumption expenditures can grow independently of income to a large extent, at least for some time (Barba and Pivetti, 2009). This increase in autonomous consumption can also be tied to the attempt to keep up with the Joneses and to 'invest' in an appropriate lifestyle, as argued by a renewed and large literature on this topic (Brown, 2008).

As argued in the previous section, the mechanism first described by Serrano (1995b) and illustrated by equation (2) is far from being purely theoretical. There is empirical evidence that consumption can be considered as an autonomous component, or at least a component that is more exogenous than GDP or business investment. There is further empirical evidence that household residential investment plays a crucial role in driving economic activity, at least in the United States, with business investment reacting with a lag to the fluctuations in cash flows and in the rate of capacity utilization, so that investment in capacity is essentially an induced component of aggregate demand. A rise in household residential investment is also likely to be associated with a rise in the consumption of durable goods as households who purchase new dwellings are likely to purchase new furniture and all kinds of new household appliances.

There is no doubt that most post-Keynesians have not paid enough attention to the autonomous or semi-autonomous components of household consumption or household investment. This became obvious during the subprime financial crisis since, with a few exceptions such as Brown (2008), Dutt (2006) and Palley (1996), most post-Keynesian models of financial instability, for instance, were predicated on the destabilizing behaviour of banks and production firms, and not on that of households. To take residential investment seriously into account may also allow post-Keynesian researchers to solve another puzzle—the fact that the growth rate of employment roughly follows the growth rate of active population over the long run, that is, the fact that the rate of unemployment does not systematically rise or decrease.[13] Gowans

[12] Thus, adding to the confusion over terminology, Pérez-Caldentey and Vernengo (2013) refer to the Kaldorian tradition when discussing models based on induced investment and non-capacity creating exogenous growth components such as Serrano's Sraffian supermultiplier analysis.

[13] See Lavoie (2014, pp. 411–6) for an exposition of a non-exhaustive number of mechanisms purporting to solve this puzzle.

(2014) argues that in countries with advanced credit systems, where new households can get mortgages from the financial system, the growth in population generates a demand for real estate investment, which feeds back into aggregate demand. He constructs an overlapping-generation model which is stock-flow consistent and where investment is fully induced. He is, thus, able to derive a model where unemployment is demand-driven, but where the economy converges to a demand-led growth rate that turns out to be equal to the growth rate of (active) population, with the unemployment rate being constant, but positive and demand-dependent, while the actual rate of capacity utilization is equal to its normal value.

Ultimately, one may wonder whether changes of income distribution or in the propensity to save will only generate level effects rather than growth effects. If one finds the theoretical and empirical arguments of León-Ledesma and Thirlwall (2002) convincing, an increase in the average rate of growth generates an increase in the natural rate of growth, which might then also generate a feedback effect on the growth rate of autonomous consumption and real estate expenditures or on other autonomous expenditures, such as those of government.

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