Texto para Discussão 003 | 2023

Discussion Paper 003 | 2023

Autonomous Demand-led growth and the Supermultiplier: the theory, the model and some clarification

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February, 2023

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Abstract

Recent criticism of the autonomous demand-led supermultiplier growth model claims that this model is unrealistic since: (a) the normal degree of utilization is exogenous but should be endogenously determined; (b) the model may still be dynamically unstable and, even if stable, the adjustment process is too slow for its steady state to be relevant; (c) there is no role for autonomous investment; (d) autonomous demand grows at a constant rate (e) autonomous demand is completely exogenous and cannot be autonomous in the long run; and finally that (f) economic growth in the Supermultiplier model is unconstrained and depends on exogenous factors. The purpose of this paper is to reply to these critics by clarifying the key elements of the theory behind the model (namely, the key notions of non-capacity creating autonomous demand and induced business investment) and by clearly distinguishing these from the specific simplifying assumptions adopted in the simple baseline model for analytical purposes. We argue that the critics have used different interpretations of the key concepts of induced investment and non-capacity creating autonomous demand and/or mainly targeted the simplifying assumptions that are in no way required for the general validity of the Supermultplier results by providing evidence of the many instances that can be found in the recent literature where many of such simplifying assumptions have indeed been successfully relaxed.

[1] The authors wish to thank (without implicating) Matias Vernengo, Julia Braga, Ettore Gallo, Guilherme Morlin, Stefano Di Bucchianico, Matteo Deleidi, Riccardo Pariboni, Ryan Woodgate, Mark Setterfield, Danilo Spinola and Peter Skott for helpful comments on earlier versions of this paper.

1 Introduction

In the demand-led Supermultiplier growth model, functional income distribution is separately determined (usually along Sraffian or Kaleckian lines), business investment is an induced expenditure, and the trend rate of growth of the economy is driven by the expansion of autonomous components of demand and the changes in the propensity to spend. Mainly discussed among Sraffians since the mid-1990s,[2] more recently, the model has received attention from a broader group of researchers. The initial impetus for the latter movement can be largely explained by the adoption of the model by Kaleckian authors,[3] and also as a result of the clarification of the conditions for the dynamic stability of the Sraffian version introduced by Freitas and Serrano (2015). The model is now recognized as providing an alternative closure for heterodox growth models (Dutt, 2019; Serrano & Freitas, 2017), which is not subject to Harrodian instability (Lavoie, 2016; Serrano, Freitas & Bhering, 2019). And in the last few years, more neo-Kaleckian (e.g., - Hein & Woodgate, 2021), as well as a number of other post-Keynesian (Fazzari et al., 2020; Palley, 2019) and neo-Schumpeterian (Deleidi & Mazzucatto, 2019, 2021, Caminati & Sordi, 2019) versions of Supermultiplier have appeared.[4]

As it is only natural, the greater diffusion of the model in the heterodox literature on demand-led growth also brought with it new critics. The critics claim that the model is unrealistic as it assumes that: (a) the normal degree of utilization is exogenous but should be endogenously determined; (b) the model may still be dynamically unstable and, even if stable, the adjustment process is too slow for its steady state to be relevant; (c) there is no role for autonomous investment (e.g., Nikiforos, 2018, Oreiro et al., 2020); (d) autonomous demand grows at a constant rate (e.g., Skott, 2017 and 2019); (e) autonomous demand is totally exogenous (e.g., Nikiforos, 2018 and Skott, 2019) and cannot be

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[2] On this earlier Sraffian debate see Garrido Moreira & Serrano (2019), Freitas & Serrano (2015), and the papers in the Symposium in honor of Pierangelo Garegnani in the Review of Political Economy (Cesaratto and Mongiovi, 2015).

[3] In this connection, see the seminal contributions by Allain (2015) and Lavoie (2014 and 2016).

[4] See also the symposium on the role of autonomous demand in demand-led growth models in Metroeconomica (Kurz and Salvadori, 2019).

autonomous in the long run (e.g., Nikiforos, 2018); and, finally, (f) that economic growth in the Supermultiplier model is unconstrained (Nikiforos, 2018) and depends on exogenous factors (Blecker and Setterfield, 2019).

This paper aims to reply to these critics by clarifying the key elements of the theory behind the model and by clearly distinguishing these from the specific simplifying assumptions adopted in the simple baseline model for purely analytical purposes. The demand-led Supermultiplier results are ultimately based on two key general theoretical assumptions (explicitly set out in Serrano, 1995a and 1995b). The first is that there is a part of aggregate demand that both (i) consists of an autonomous injection of new monetary purchasing power in the economy and (ii) does not create productive capacity for the business sector of the economy. And the second key idea is the view that, in a capitalist economy, competition and the search for profits imply that gross business investment is a derived magnitude, induced by expected effective demand and explained by some version of the principle of the adjustment of the capital stock (or flexible accelerator mechanism) (Matthews, 1959). These two general assumptions are also the necessary basis for the notion that there is a tendency of the capital stock (and thus productive capacity) to adjust to the trend of demand.

In each application, these two general assumptions must be embodied in more definite specific assumptions to produce a particular formal model based on them. And, in fact, most discussions about the demand-led Supermultiplier model have been made using very simple versions of the theory, based on a number of simplifying assumptions, in order to assess its analytical properties such as the level and growth effects of changes in the exogenous variables of the model, or the sufficient conditions for dynamic stability (e.g., as in Freitas and Serrano, 2015).

We shall argue that some of the critics appeared to have adopted different interpretations of the two key assumptions on autonomous demand and induced investment, while the simple versions of the model seem to have misled many other critics, that have mostly targeted the simplifying assumptions that are in no way required for the general validity of the Supermultplier results. We shall also report on some of the many instances that can be found in the theoretical and empirical literature where such specific simplifying assumptions have indeed been successfully relaxed and that have largely confirmed the main results of the Supermultiplier.

The rest of the paper is organized as follows. In section 2, we will discuss the importance of the assumptions of autonomous demand and induced investment from the general perspective of the Supermultiplier as a *theory* of effective demand and contrast this with the specific simplifying assumptions of a baseline version of the Supermultiplier as a simple formal demand-led growth *model*. We then proceed in section 3 to both provide a partial survey of some recent developments in the supermultiplier literature and use the results of the clarification made in the previous sections as the basis for addressing the various objections of the recent critics. The last section contains brief final remarks.

2 Autonomous Demand and induced investment: the theory and the model

2.1 Effective Demand and Output

The version of the principle of effective demand used by the Supermultiplier states that in the long run, no less than in the short, the level of real aggregate demand, measured at its normal long-period normal or supply prices, determines the level of real output. The level of aggregate effective demand is then determined for a given configuration of supply prices, and these are determined by the technique in use and one distributive variable (either the real wage, the normal rate of profits, or a profit markup, depending on the version of the model) whose normal or trend value is given exogenously (though some cyclical fluctuations of distributive shares around these central values could easily be incorporated). This analytical separation of the determination of outputs and prices is typical of both the Sraffian and Kaleckian approaches and adopted by many other post-Keynesians.[5]

[5] This is in sharp contrast with models based on the so-called Cambridge theory of distribution, in which in the long run it is the level of real aggregate demand that adjusts endogenously to an exogenously given

As for how the level of aggregate effective demand itself to be determined, if aggregate effective demand determines total aggregate income, this requires that at least part of total expenditures must be independent of the income generated by production decisions. This is done by looking at the circular flow of income, specifying what is the source of monetary purchasing power behind different types of expenditures.[6] Here, as summarized by Kaldor, the level of real aggregate demand is composed of an "[…] endogenous component that varies in *proportion* to the costs incurred by entrepreneurs (which constitute the income of wage and salary earners) and an exogenous component which is financed out of capital - by borrowing or by the sale of financial assets, which comes to the same thing - and that Keynes treated as a given factor in the short period [...]" (Kaldor, 1989, p. 90, emphasis in the original). Thus, in the circular flow of income, the part of the contractual income (wages and salaries) generated by firms' decisions to undertake production that is spent on consumption is the induced component of aggregate demand. It follows that there is regular feedback from production to aggregate demand, which is why we call this part of consumption an induced expenditure, as it is directly and systematically related to the production decisions by firms.[7]

Consequently, "all other expenditures are thus necessarily financed by changes in the net financial asset position of the agents (spending previously held money or new credit

level of potential output by endogenous changes in distribution following a forced saving mechanism through which it is the share of profits, instead of the level of output that is determined by demand (see Kaldor, 1955/6). For a discussion of why the models based on the Cambridge closure do not generate demand-led growth see Serrano e Freitas (2017).

[6] In the Supermultiplier model, following what is becoming a consensus in the heterodox literature, it is assumed that money is endogenous and the Central Bank is a monopolist in the bank reserve market that can, in general, guarantee the smooth functioning of the financial system by operating in the payment system, buying and selling assets, setting exogenously the basic interest rate and accommodating the endogenous credit money created by the banks, which ultimately finances private autonomous spending on capacity creating investment and other autonomous expenditures as well as the credit necessary to pay the wage bill (Pivetti, 1991; Wray, 1998; Lavoie, 2014; Cesaratto and Di Bucchianico, 2020)

[7] It is important to notice that although consumption financed by the wage bill is seen as an induced expenditure related to the level of output, the corresponding wage bill itself must be financed by firms and not by workers (Cesaratto and DiBucchianico, 2020).

creation) and not by current income." (Serrano, 1995b p.20).[8] Thus, business investment but also all other non-capacity creating expenditures not financed by contractual incomes as autonomous from the point of view of the circular flow of income, for as we know from Kalecki, "[…] capitalists may decide to consume and to invest more in given period than in the preceding one, but they cannot decide to earn more. It is, therefore, their investment and consumption decisions which determine profits, and not vice versa" (Kalecki, 1965[1991], p. 240).

In capitalist economies, production is an activity undertaken for profit, which means that the contractual income generated in the production process as wages and salaries, even if it was immediately and entirely spent would never be sufficient to buy back the whole of the aggregate product.[9] Therefore, as we know from the theory of the multiplier, the amount of the total autonomous demand in the above sense and the aggregate marginal propensity to consume these contractual incomes determines the aggregate levels of output and income.[10]

[8] The same observation is made by Hein and Woodgate "[t]his is only possible if those sectors generating autonomous demand growth have wealth they can draw on and/or access to credit" (Hein and Woodgate, 2021, pp. 390).

[9] It can be argued that land rents are also contractual incomes. In this case, it would be easy to add the induced consumption of landowners (most likely with a very low marginal propensity to consume). Realized profits, however, would still be a residual magnitude, what is left over after total costs (now including rent), and would also still depend on what profit earners spend.

[10] We think it is much more realistic and tend to prefer to treat the consumption of those whose income comes from profits (or more generally the surplus) as basically discretionary and thus autonomous rather than induced as a proportion of their income, as these are naturally quite a few in number and have considerable accumulated wealth. But there is no problem if one wants to treat the consumption of capitalists as partially (as in Kalecki's writings) or, even quite unrealistically, wholly (as in most of the modern heterodox growth model literature) determined by their level profit of income, with the provision that current realized profits being a residual magnitude of total expenditures cannot really be expended and thus the propensity to consume out of profits must refer either to some past (as explicitly done in Kalecki) or expected level of profits.

2.2 Autonomous demand that does not generate capacity

But when we want to move beyond the circular flow of income and the determination of the short-period level of aggregate effective demand to a longer run, the effects of business investment on the stock of capital and the levels of productive capacity must be considered. In this context, we must make a further distinction between capacity and non-capacity generating expenditures. Thus, we have on one side capacity generating expenditures, defined as gross investment by private firms that necessarily have effects on the productive capacity of the private sector and those components of autonomous demand that do not have such effects. The latter, ‘non-capacity creating autonomous expenditures’, “are all those expenditures (whether formally classified as consumption or as 'investment') that are neither financed by the contractual (wage and salary) incomes generated by production decisions, nor are capable of affecting the productive capacity of the capitalist sector of the economy (…) [they are] completely independent of the 'supply' side (i.e. output and capacity) of the economy” (Serrano 1995a p. 71).

Among these ‘non-capacity creating autonomous expenditures’, we find household´s residential investment, discretionary business expenditures that do not generate capacity (as expenditures in research and development, for instance), consumption financed by credit, the discretionary consumption expenditures of the wealthy, government expenditures (including government investment), the part spent of consumption of government transfers to households, and exports. These expenditures have multiple determinants that reflect economic, social, political and institutional forces, but have in common the fact that they represent fresh autonomous injections of demand and do not have capacity effects for the private sector of the economy in question.[11] One of the two crucial assumptions of the Supermultiplier is the existence of some amount of this type

[11] Of course, only the domestically produced components (net of imported content) of all those expenditures, autonomous or induced, capacity generating or not affect domestic levels of output. Note that we include in autonomous non-capacity creating demand all exports, including that of capital goods, as these goods will not have capacity effects on the economy that exported them. We also include all government expenditures including public investment that has important effects on the overall efficiency of the economy but also does not directly affect the size of the productive capacity of the private sector. Both of these expenditures constitute only sources of demand for the private sector of the economy in question.

of autonomous expenditure in the economy, something which is empirically sound, but that is absent from most heterodox growth models.

2.3 Induced investment and the Supermultiplier

In what regards the determination of the levels of capacity creating investment by firms, the central issue, as put by Kalecki is that "[t]he tragedy of investment is that it causes crises because it is useful" (Kalecki, 1937, p. 77). In other words, as undesired underutilized capacity is very expensive, in a capitalist economy, firms as a whole are compelled not to invest too much relative to demand. On the other hand, when demand increases, firms will not want to lose market share and thus are bound to increase investment. As Garegnani (2015[1962], pp. 12-3) put it:

> "The principle that the level of investment depends on the growth of final demand is variously employed in cycle theory and in the theory of economic growth, in the form of the 'acceleration principle'. It furthermore jibes with common experience. Any increase in the demand for a good will, after an initial period in which production pushes up against the capacity limits of the firms in an industry, eventually induce an expansion in the size of the firms or an increase in their number, and hence an increase in investment. What has for a long time hindered economic theory from taking account of this key factor determining the growth of the economic system has been the principle of the tendency for investment and the saving obtainable from full capacity utilization to equalize."

We thus have, as the second crucial theoretical assumption of the Supermultiplier theory, the idea that competition impels firms to invest to try to adjust capacity to the trend of demand, both at the sectoral and aggregate levels. In other words, gross business investment is driven by the capital stock adjustment principle.

According to this principle, the more persistent levels of output explained by effective demand determine, through the normal capital-output ratios, the desired capital stock of firms and govern their gross capacity-generating business investment (Matthews, 1959). The relevant normal capital-output ratios for the different capital goods and sectors depend on the technical capital-output ratio and the normal or planned degree of capacity utilization. For a given set of technical conditions of production and one exogenous distributive variable, the chosen technical capital-output ratios result from the cost-minimizing choices made by firms under capitalist competition. On the other hand, technical indivisibilities, the historically observed typical pattern of the ratio of peak-to-average demand and the degree of seasonality in each market, are the main determinants of the normal degree of capacity utilization (Ciccone, 2011, Trezzini & Pignalosa, 2021, Haluska, Summa and Serrano, 2021), that allows firms to meet expected peaks of demand during the lifetime of the capital equipment while allowing also for an amount of extra planned spare capacity to prevent firms from losing market shares to their actual and potential competitors if demand suddenly increases.[12]

The capital stock adjustment principle is thus the foundation of a theory in which (sectoral and aggregate) business gross investment demand is conceived as a derived magnitude, depending on expected and actual levels of output, and thus considered as induced demand in the longer run.[13] Although both induced components of effective demand

[12] Thus, normal capital-output ratios are determined once the technical conditions, income distribution, and conventions about long run patterns of output fluctuations are given. These ratios establish a direct relationship between the levels of output expected to prevail in the future and the required capital stock that can normally support these expected levels of output (including its peak levels over the cycle) while covering (normal) production expenses and allowing, at least, the obtainment of a minimum required (normal) rate of profit. If the profit rate in a production activity happens to be lower than this minimum, such production activity is not viable in the long run, and, accordingly, investment in this activity would tend to be interrupted. Conversely, when the profit rate is equal to or above the minimum, investment would eventually adjust the available capital stock upwards to the corresponding level defined by the normal capital-output ratios and the expected levels of output (for more on this see Freitas, 2023).

[13] It is important to notice that individual investment decisions can be influenced by many factors other than those appointed by the capital stock adjustment principle. However, the degree of capacity utilization and profit rate for an individual firm is not independent of the investment decisions made by other firms that dispute the same markets. Therefore, it is actual and/or potential competition from other business firms that prevents persistent under or overutilization of existing capacity within certain bounds in all sectors. The latter argument incidentally illustrates that the determination of investment derived from the choices of some "representative firm" is highly problematic and prone to fallacies of composition when applied to the analysis of sectoral and aggregate business investment.

proposed in the Supermultiplier theory refer to the systematic relation with the levels of output, it is worth noticing that their nature is very different. While induced consumption is related to production through expenditures financed by the contractual incomes generated by production decisions in the circular flow of income, aggregate business investment is related to levels of output only in a longer period, as firms are forced by competition to attempt to adjust productive capacity to the evolution of demand and output.

The key assumption that gross business investment is a derived magnitude that will tend to track demand and output leads us to the concept of the propensity to invest, that is the practice of representing gross investment primarily as a share of output. This is useful because it makes it easier to see the macroeconomic implications of how our two key assumptions of autonomous non-capacity generating demand and induced investment lead to a supermultiplier process in which a given level of autonomous demand will induce both additional demand for consumption of the traditional multiplier via a given marginal propensity to consume of the economy, determined by the propensity to consume of wage earners and the wage share, and additional levels of investment through the given propensity to invest.

Note that given the normal capital-output ratios the propensity to invest at the normal degree of capacity utilization is necessarily a function of the rate of growth of output. This, together with the key assumption that firms are always trying to adjust capacity to demand, entails that the actual propensity to invest becomes a function of the expected trend of growth of demand.

Accordingly, the propensity to invest will tend to increase when the trend growth rate of demand increases, and there is a tendency towards higher-than-normal actual degrees of utilization and to fall whenever the trend growth rate of demand slows down and persistent capacity underutilization sets in. It is through these adjustments in the levels of the propensity to invest that there will be a tendency for the actual degree of capacity utilization to move towards its normal degree. In practice, however, that tendency will usually be quite slow both because of the long economic life of many capital goods and the gradual revision of expectations about the future trend of demand over the lifetime of newly installed equipment.

Moreover, this necessary connection between the propensity to invest under given technical conditions of production and the growth rates of demand and output, when firms are assumed to be striving to adjust capacity to demand and a trend towards normal capacity utilization, also allows us to establish the structural limits to demand-led growth. Only rates of growth of autonomous demand that are below a maximum that would make the propensity to invest plus the marginal propensity to consume equal to one are compatible with the exogenously given distribution of income and thus with output and capacity being truly demand-led.[14]

Thus, the main ideas that come from the Supermultiplier theory, namely, that sustained demand-led growth depend crucially on the expansion of non-capacity creating components of aggregate demand and on changes in the determinants of the marginal propensity to consume spring directly from these very general, and in our view, quite reasonable assumptions.

2.4 The Supermultiplier as a baseline demand-led growth model

We have argued that the central ideas of the demand-led Supermultiplier can be valid under quite general conditions established from reasonable assumptions. When we embody these central ideas in a formal theoretical model, we can get further interesting analytical results, but then we naturally face a trade-off between the conceptual clarity and sharpness of a simple model and its degree of generality. Complex models can always be built, but, after a point, they tend not to have analytical solutions and to be quite cumbersome as a heuristic device. Most of the recent debate about the demand-led Supermultiplier has focused on the very simple formal models in which these ideas and their main theoretical implications have been presented in the literature. However, any

[14] Above this maximum rate of growth, some forced saving and thus an adjustment of aggregate demand to aggregate supply would be necessary. And of course, the economy could still be demand-led for somewhat higher rates of growth if firms remain content with the actual degree of capacity utilization being permanently above the normal degree (but that would contradict the key assumption of induced investment).

particular version of the demand-led Supermultiplier growth model is, like any model, a simplified framework kept simple on purpose by abstracting from many details that are not central to the problem at hand and constructed to isolate and explain in exact terms some selected aspects of economic phenomena under study.[15] And in order to do this, a baseline demand-led Supermultiplier model makes a number of drastic assumptions to show its main properties and results with greater clarity. The main simplifying assumptions adopted are: a closed economy with no government sector; the economy produces a single good with a given single method of production combining a single homogeneous capital good and labor; the wage share and the propensity to consume out of wages are exogenously given (its product being denoted by c); there is only one aggregate component of non-capacity creating autonomous demand, the discretionary consumption of capitalists (Z), growing at a constant rate (z); there are no financial constraints to the growth of autonomous demand at this rate; no constraints to the financing of output increases and to investment; no explicit discussion of technical change and how the supply of labor is made to grow in line with demand to avoid labor scarcity; and a very simple and mechanical induced investment function in which the propensity to invest depends on some expected trend growth of demand g^e, gradually revised by the actually realized growth rates g as:

(1) $h = (v/u_n)(d + \beta g_{t-1} + (1-\beta)g^e_{t-1})$

where v/u_n denotes the normal capital-output ratio (v is the technical capital-output ratio and u_n the normal degree of capacity utilization) and d the replacement drop-out rate With these assumptions, we can easily derive the demand determined long period level of output via a Supermultiplier model, as a ratio between autonomous demand Z and the marginal propensity not to spend (one minus the marginal propensity to consume c and the propensity to invest):

(2) $Y = Z/(1 - c - (v/u_n)(d + g^e))$

[15] See Nikiforos (2020) for a defense of the usefulness of abstraction in economic modelling.

Also under these assumptions, we know that provided the adjustment of the propensity to invest in (1) is sufficiently gradual (β is sufficiently small), there will be a tendency of productive capacity Y^* to adjust to demand, and the economy will tend to grow at the rate that autonomous demand Z grows (z) so that the economy will slowly gravitate towards the path of fully adjusted positions described by:

(3) $Y^* = Y = Z/(1 - c - (v/un)(d + z))$

The very simple baseline model set out above, precisely because of its simplicity, allows us to isolate the mechanism responsible for adjusting productive capacity to demand making it clear the specific closure provided by the Supermultiplier models as an alternative to other baseline (and equally simplified) heterodox growth closures (Serrano and Freitas, 2017, Dutt, 2019). Indeed, these very simple models were sufficient to show that an alternative closure that relied on the combination of an investment behavior based on the capital stock adjustment principle with an independently growing non-capacity creating autonomous demand component existed. At the same time, their simplicity was also instrumental in the analysis of the required conditions for the dynamic stability of the supermultiplier process (Allain, 2015; Freitas and Serrano, 2015; Lavoie, 2016; Dutt, 2019).

3 The Supermultiplier: demand-led growth determinants and constraints

In our view, most of the recent criticism directed to the demand-led Supermultiplier model falls into two categories. The first type of criticism is, in fact, addressed at the mostly harmless simplifying assumptions of the baseline versions of the model, equivalent to assumptions of this sort we find in all other growth models (including those favored by these critics) and, as such, tends to miss the target. On the other hand, there is a second type of criticism that appears to arise from the critics implicitly adopting different definitions and/or interpretations of the key concepts of induced investment and non-capacity creating autonomous demand. The latter type of criticism is, in fact, extremely useful to us as it shows the need for further conceptual clarification of the demand-led Supermultiplier, and we will try to address it in this section.

Many objections have been raised by these recent critics of the demand-led Supermultiplier model. It is important to notice that these recent critics however recognize that this model is an alternative closure for demand-led growth models. However, some critics of this model like, Shaikh (2016, pp.611-612) and Michl (2009), incorrectly interpreted the Supermultiplier as a supply-constrained growth model, or as a model that would be incompatible with demand-led growth. This lack of clarity about the demand-led character of the model was also much present in the earlier literature, e.g. Trezzini (1995,1998), Schefold (1998), Park (2000), Barbosa-Filho (2000) and Palumbo and Trezzini (2003), but after the clarification of the issue in Freitas & Serrano (2015) (see also Moreira and Serrano, 2019) this issue appears to have been largely settled and will not be pursued here.[16,17]

We must recall that the simplifying assumptions about the trend of non-capacity creating autonomous demand were proposed as a *starting point* precisely to emphasize the importance of the evolution of this type of expenditure to demand-led growth, by devising a theoretical framework in "which a particular evolution of the autonomous components of aggregate demand is not 'taken for granted'" (Serrano, 1995, pp. 514-515), keeping in mind that further "research efforts should focus on the determinants and dynamics (particularly financial) of the trend of growth of the different 'unproductive' autonomous

[16] Oreiro et al (2020) agree that the Supermultiplier growth model is demand-led but misunderstand both the model and the very concept of Say's law by saying that the Supermultiplier is a "model in which Say's Law applies to the level of capacity utilization" (Oreiro et al, 2020, pp. 515), confusing the very well known 'law' itself - 'supply creates its own demand' - with its consequence - that the economy operates always at full capacity (or normal utilization) level - not paying due attention to the facts that (1) in the Sraffian Supermultiplier model this convergence to the normal utilization happens only as very long run tendency and (2) from a very different – actually, opposite – adjustment mechanism, that is, capacity (supply) adjusting to (the trend of effective) demand.

[17] Note, however, that a new version of a supply-led growth model with induced investment (through a flexible accelerator) and an accommodating aggregate demand based on effects of wealth on consumption has been proposed by Nomaler et al (2021).

components of demand.” (Freitas and Serrano, 2015, p. 280). While dealing with the recent criticism of the model we will also refer below to recent research on the Supermultiplier model that has been done by addressing these issues.

3.1 The normal degree of capacity utilization: exogenous or endogenous?

The main determinants of the normal degrees of capacity utilization, briefly discussed in section 2 above, are related to the usual sectoral pattern of demand fluctuation, technical indivisibilities and while these could possibly, under certain circumstances, be affected by the rates of growth of demand, we are skeptical that it would be useful to postulate any simple or regular general functional relationship between these variables. For this reason, this variable is taken as given exogenously in the Supermultiplier model. However, Nikiforos (2018) argues that normal rates of capacity utilization are endogenous and related to the growth rate of demand and explicitly criticizes the Supermultiplier model for supposing an exogenous normal rate of capacity utilization. The idea of an endogenous normal degree of capacity utilization, related to the actual degree of utilization and the growth rate of demand is controversial on both theoretical and empirical grounds. Among post-Keynesians, Skott is critical of the idea of an endogenous normal rate of capacity utilization (Auerbach and Skott 1988, Skott, 2012). An early criticism can be found in Ciccone (1987) and more recently, from the Supermultiplier point of view, in Pariboni and Girardi (2019), Fiebiger (2020), Haluska (2020), and Haluska, Summa & Serrano (2021).

Here we will not discuss these issues but draw attention to the presumed endogeneity of the normal degree of capacity utilization considered as a possible critique of the Supermultiplier. For the sake of argument, let us assume that there is indeed a definite function that relates the normal degree of capacity utilization directly to the rate of growth of demand, such that the normal degree of capacity utilization, besides its exogenous determinants, in fact, increases with the rate of growth. If this happens to be the case, we can easily see from equation (2) of our baseline simple Supermultiplier model in section 2 above that introducing this relation in the model would have the consequence of basically making the propensity to invest become somewhat less sensitive to increases in the actual growth rate of demand as less new capacity would now be necessary to meet it.[18] This would, ceteris paribus, reduce the change in the propensity to invest both during the adjustment process and its value in the fully adjusted position, making the model's equilibrium more prone to be dynamically stable and compatible with higher rates of demand-led growth. The trend rate of growth would, however, still be determined by the rate of growth of autonomous demand, and as investment is still induced, capacity would more easily adjust to demand. Therefore, if such endogeneity of the normal degree of utilization were to be established as theoretically and empirically relevant, the main conclusions of the Supermultiplier model would only be reinforced.[19]

3.2 Dynamic instability and the slow adjustment of capacity to demand

Another common criticism of the Supermultiplier model is that it could well be dynamically unstable, and, even when stable, the full adjustment of capacity to demand may take too long to be relevant.

As for dynamic stability, it is true that even assuming that autonomous demand grows at a rate lower than the structural maximum rate at which growth could be demand-led anyway (mentioned in section 2.3 above), the model may still be dynamically unstable. Regarding the local dynamic stability of the model's equilibrium with simple linear adjustment processes, the sufficient condition (as has been demonstrated in the literature by, for example, Allain, 2015; Freitas and Serrano, 2015; Lavoie, 2016; Serrano, Freitas & Bhering, 2019; and Dutt, 2019) is that the marginal propensity to spend during the

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[18] Note, however, if this possible effect is assumed to be so strong that an increase in the trend growth rate of demand turns out to have no impact on the induced investment share this would be extremely unrealistic, as the dependence of the investment share on the growth rate is very well empirical regularity (e.g., Girardi and Pariboni, 2020; Haluska et al., 2021).

[19] In fact, the effect would be analogous to a capital-saving pattern of technical change that reduced exogenously the technical capital-output ratio (discussed in Cesaratto, Serrano & Stirati, 2003). Note that in our baseline model, we are taking the real wage as given, and thus the reduction of the normal capital-output ratio as the rate of growth of demand increases will also increase the normal rate of profits.

adjustment process should remain below one, something that additionally requires that the reaction of the propensity to invest to the actually realized rate of growth of the economy (and/or the actual degree of utilization depending on the version of the model) is not too strong. This means that firms must be assumed to be trying to adjust capacity to demand gradually via a flexible accelerator process. In terms of our simple baseline model of section 2, this means that the equilibrium of the model is dynamically stable only if the parameter β is sufficiently small.[20]

The matter is thus empirical, but relatively easy to test. In this connection, we should mention a set of econometric papers that obtained good results in what regards both the strong causal connection between the growth of demand (or non-capacity creating autonomous demand) and the (non-residential) investment share and the gradual adjustment of the latter, for different countries, periods and methodological approaches (Braga, 2006, Medici, 2011, Girardi and Pariboni, 2016,2020; Fiorito, 2018; Braga, 2020; Pérez-Montiel and Manera, 2020; Fazzari et al. 2020; Girardi et al., 2020; Haluska et al., 2021a, Goes and Deleidi, 2022). In particular, contrary to what was argued by Skott (2019), both Fazzari et al (2020) and Haluska et al. (2021a) found very small values for the parameters measuring the reaction of business investment to changes in the expected growth rate for the US economy and their simulations showed that the model seems to be dynamically stable for a wide range of rates of growth of autonomous demand.[21] These studies appear to confirm what we know about the accelerator effect from earlier econometric studies of investment functions based on the flexible accelerator, that investors do significantly react to changes in current demand but not too intensely.

[20] In fact, these sufficient formal conditions for dynamic stability could, in principle, be somewhat relaxed by introducing non-linearities either on the investment function (e.g., those used in White, 2008; Caminati and Sordi, 2019) or in other parameters of the model (e.g., assuming that distribution and thus the marginal propensity to consume of the economy is endogenous through a Cambridge forced saving mechanism in the short run, like Bortis, 1997). The challenge here is to find empirically relevant non-linearities.

[21] Haluska et al.(2021b) uses the effective data on growth rate of the US economy (with its volatility) and shows that the model presents no instability, on the contrary, the simulated outcome tracks quite well the effective data.

On the other hand, precisely because of the gradual reaction of investment to changes in demand, the adjustment of capacity to demand is an inherently slow process, both because of the gradual revision of demand expectations and the relatively long economic life of many fixed capital goods. And some critics claim that this would be so slow as to make the results of the fully adjusted positions or steady-state of the model (equation (3)) irrelevant, as before such positions could be reached the independent variables of the model might and probably will have changed considerably.

However, we consider (following Garegnani, 2002) that pure economic theory is concerned with the sign, not the exact magnitudes of the effect of changes in the independent variables and no equilibrium position needs to be actually reached to be relevant. And the process of adjusting capacity to demand, however slowly and bound to interruptions, is ever present (Ciccone, 1986; Garegnani, 1992), even if never fully completed, as competition impels firms to treat investment as a derived demand. That is, "even if the system does not converge to steady state, the steady state can function as a 'center of gravity' for actual dynamics." (Fazzari et al., 2020, p. 589). The fact that, in reality, the average growth rate of non-capacity creating autonomous demand is not constant and the economy probably will never really achieve a fully adjusted position does not imply that having the changing steady-state as a reference to which the variables will move towards is not important to both theoretical and empirical analysis.

In the specific case of the Supermultiplier model, we consider that the gravitation of the economy towards its long-period position (with a given propensity to invest as in equation (2) of our baseline model) with the actual degree of utilization in general being, different from normal, does not need to be particularly long. Indeed, notice (as shown in Freitas and Serrano 2015) that the effects of changes in the variables that determine these long-period positions are all in the same direction and are only reinforced in the fully adjusted positions (described by equation (3) in our baseline model). In fact, the only different result in the case of the fully adjusted positions, is that a change in the rate of growth of autonomous demand, besides having a positive rate of growth effect on the economy, also brings with it a further positive level effect, as the propensity to invest (and with it the size of the supermultiplier) increases with the higher rate of growth of the economy. In the long period but not fully adjusted positions, the latter effect is not present at all, since it is assumed the adjustment of the induced investment share has not yet started (if the expected trend growth rate of demand has not changed yet), or has started but has only partially been completed (if the expected trend growth rate has only been revised partially towards the new actual rate of growth of demand).[22]

Moreover, since the Supermultiplier model also includes assumptions about the adjustment of the propensity to invest (as in equation (2) of our baseline model) it can also be used to study the behavior of the economy at any time during the process of adjustment. Thus, while Nikiforos is correct when he says about the Supermultiplier that "[i]ts **main contribution** is to provide a theory of long-run growth based on autonomous expenditure" (Nikiforos, 2018, p. 660, emphasis added), we disagree with his conclusion that "its assumptions and conclusions have to be evaluated with reference to the long run" (Idem, p. 660). We believe that the model can be applied, and its performance can be evaluated not only in terms of how it explains very long-run trends but also in what regards cyclical fluctuations as well. On this point, and agreeing with Skott (2019) that oscillations of the levels of non-capacity creating autonomous demand can be very irregular in the real world (more on this below), we should add that the behavior of the non-capacity creating autonomous demand is thus important both to the cycle and the trend rate of output growth, and can explain (together with changes in the size of the supermultiplier) the patterns of concrete historical experiences (Fiebiger 2018; Fiebiger and Lavoie, 2019, Pérez-Montiel and Pariboni, 2021).[23] And as Lavoie pointed out, in fact "more attention should be paid to the average values achieved during the traverse than to the terminal points." (Lavoie, 2016, p.183).

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[22]Although we agree with Gallo (2022) on the importance of traverse analysis, we believe that it is not so easy to associate historical time with the logical time subjacent to economic models.

[23] In this sense, we disagree with Skott (2019, p. 9) when he says that "[i]ntuitively, a medium-run interpretation of this approach would suggest that the effects of a financial bubble (or other temporary shocks) can be analyzed by focusing on the steady-growth implications that would follow if the financial bubble were to last forever. But the bubble will not last forever—it is a bubble—and the steady-growth implications are of little interest unless the convergence to steady growth is fast." The fact that a bubble will not last forever is not in contradiction with the fact that both the bubble and the burst are not necessarily neutral to growth and thus can have permanent effects (Jorda et al, 2015, Girardi, Meloni and Stirati, 2020, Pérez-Montiel and Pariboni, 2021).

3.3 The effects of autonomous investment

As for the claim that there is no role for autonomous capacity-creating business investment decisions in the Supermultiplier model, we must distinguish between two positions. According to the first one, there is no room for this type of expenditure in this model, which, as we shall presently see, is not true. The latter position must be distinguished from a second position according to which autonomous investment cannot generate sustained growth by itself. We argue that the last proposition is, indeed, correct and it is, in fact, one of the main results of the demand-led Supermultiplier. Being a consequence of the tendency of capacity to adjust to demand, we do not see it as a problem from the viewpoint of the Supermultiplier approach. In fact, it is possible to incorporate autonomous capacity creating investment decisions in the demand-led Supermultiplier model and this has been done explicitly in the literature. In versions of the model in which gross business investment share is determined by the normal capital-output ratio and the expected trend rate of growth of demand and through a flexible accelerator mechanism, this expected trend rate of growth is assumed to be gradually revised in the light of what happened to the actual rate of growth of the economy via a simple adaptive expectations mechanism. This consists of a weighted average between an exogenous initially expected growth rate and the recently observed past actual growth rate. Being exogenous, we can shift this initial expected growth at will to represent a shock caused by a sudden autonomous increase in optimist “animal spirits” (or an autonomous reduction of expected growth due to wave of pessimism). This shock will increase (or decrease) the propensity to invest and initially affect the level of output and the actual degree of capacity utilization (Serrano, Freitas and Bhering, 2019). But the important point is that the model has a mechanism that tends to correct such exogenous shocks over time according to actual experience, and as this wave of optimism (pessimism) cannot by itself automatically change the actual rate of growth of autonomous non capacity creating demand or change the determinants of the marginal propensity to consume, the trend rate of growth of the economy cannot be persistently increased (reduced) by optimism (or pessimism) alone, in contrast with what happens in the traditional neo-Kaleckian growth models.

Cesaratto et al (2003) incorporated autonomous investment related to the introduction of innovations as exogenous shocks to the expected growth rate in a Supermultiplier model to reflect the fact that " '[u]njustified' Investment [...] occurs all the time, whether because of technical change or 'animal spirits' or more generally because of the very nature of competition in a capitalist economy." (Idem, p. 45) but "this initial 'autonomous' increase in g^e [expected growth rate] gradually tends to be undone as g^e [expected growth rate] is gradually revised in the light of the actual growth rates as the effects of the excess capacity are felt." (Idem, p. 46). This result has been confirmed by Nah and Lavoie (2019a) that explicitly introduce an autonomous rate of accumulation driven by technical progress in their investment function. Combining the latter with an induced investment mechanism specified according to the capital stock adjustment principle, they showed that the inclusion of the autonomous investment component does not affect the steady-state growth rate of the Supermultiplier model. Dutt (2020) shows that the same is true if a component of autonomous investment function, elastic relative to the real interest, is introduced in the Supermultiplier model. Another formal proof that the introduction of autonomous investment in the Supermultiplier model does not affect its steady-state growth rate is presented in Fagundes and Freitas (2018).[24]

Nikiforos (2018, p. 667, emphasis added) is also incorrect when he says that in the Supermultiplier model "none of the arguments of the investment function play any role whatsoever in the **long run**" because the rate of growth follows the expansion of autonomous non-capacity creating demand. In Cesaratto et al (2003) it is shown that any permanent effect of different patterns of technical change on the normal capital-output ratios and on the economic life of the equipment and thus the replacement investment coefficients change parameters of the investment function, changing the levels of investment induced by a particular level of expected demand, and through the effects of those on the propensity to invest, affect the size of the supermultiplier and the levels of output and productive capacity even in the very long run. These permanent level effects are a result of the model and if such changes were assumed to be continuous. This would be the case, for instance, if technical change is seen as having a capital-saving pattern that

[24] As autonomous investment, when included in the Supermultiplier model, leads to fluctuations in both output and capacity utilization. Therefore, it is incorrect to say that this model "kicked up (sic) an extremely important theoretical element for Keynesian economists that is the role of animal spirits as an element of instability in the economic system". (Oreiro et al, 2020, p. 521).

provokes the fall of the normal capital-output ratios over time. Notice that, in this case, the trend growth rate of the economy and value of the supermultiplier would increase over time.

3.4 On the constancy of the non-capacity creating autonomous demand growth

Another kind of criticism is made by Skott (2017, 2019), and regards the supposed necessity of non-capacity creating autonomous demand to **grow at a constant rate** for the validity of the Supermultiplier model. In Skott (2017) this critical observation to the constant growth of autonomous demand was mentioned *en passant*. To this Skott (2019) adds that the fact that autonomous components of demand do not grow at constant rates, in reality, is in contradiction with the Supermultiplier model, which supposedly assumes constant growth of non-capacity creating autonomous demand.[25] Skott also seems to believe that the this constant growth rate assumption is important to the dynamic stability condition of the model, as he believes the response of induced investment and of its expected trend growth rate of demand to actual demand are quick and this together with volatile autonomous demand growth would lead the model's equilibrium to be unstable.

It is true that in the baseline version of the model the assumption of a single variable called non-capacity creating autonomous demand grows at a constant rate is made. But as Lavoie correctly argues *"the whole purpose of the exercise is to see the impact of an autonomous non capacity creating demand component which grows at a constant rate. This is not an issue as long as we do not assume that these circumstances will prevail until the end of time"* (2017 pp. 197-198). The same point is reinforced by Fazzari et al. (2020), which "[i]*n the realistic case that different components of autonomous demand*

[25] In his own words, "[r]esidential investment is extremely volatile and bears no resemblance to the simple models in which autonomous demand grows at a constant rate" (Skott 2019, pp.6); "[p]olicy makers have not increased government consumption at a constant, exogenously given growth rate" (Skott, 2019, pp.8); "[a]s an empirical observation, moreover, the growth rate of exports is highly volatile" (Skott, 2019, pp.3) and "[l]uxury consumption is notoriously cyclical, [...], total capitalist consumption can be income-determined, even if other components grow at a relatively constant rate." (Skott, 2019, pp.4).

grow at different rates, total autonomous demand will never grow at a constant rate in finite time" (Fazzari et al. 2020, p.589).[26] Thus, it is clear that for these researchers, and we fully agree with them, this is only a simplifying assumption that must be relaxed to study concrete historical experiences or more specific theoretical issues since "[o]bviously, no one believes that the growth rate of the semi-autonomous expenditures would be a constant value in the real world, even on average" (Fiebiger and Lavoie, 2019, p. 251).[27]

But note that, curiously, nowhere it has been demonstrated by the critics that changes in the average rate of growth of autonomous demand or oscillations around this average within the bounds we have observed in reality, really have any relevant impact on the stability conditions of the model, as opposed to the strength of the reaction of the propensity to invest to the actual rate of growth that certainly does matter.[28] And the latter is an empirical question, as we discussed above in sub-section 3.1.

The conclusions of the Supermultiplier model do not depend on the empirical constancy of the growth rate of autonomous demand or of the other parameters of the model, in the same obvious way as the conclusions of the simple Keynesian model do not at all depend on either investment or the marginal propensity to consume never changing in reality. What is relevant to the conclusions is whether investment is induced and there are autonomous expenditures that do not create capacity for the business sector of the economy. What the model implies then is that, while investing, firms as a whole will be trying to adjust capacity to demand and that the average rate of growth both over time

[26] Skott et al. (2022) wonder if this simplifying assumption in the case if a constant rate of growth of government spending should be interpreted as reflecting a simple rule for fiscal policy, but correctly concludes that the proponents of Supermultiplier have not been advocating this rule. As we argue above, the constant growth rate is just a simplifying assumption and does not have this normative purpose.

[27] We should like also to point out that in some of the neo-Kaleckian models with autonomous investment there is a constant parameter in the capital accumulation function representing "animal spirits", which being constant cannot cause "instability". Obviously, this is modeled as such just for methodological reasons, but those who are not satisfied with autonomous demand growing at a constant rate should be equally concerned with this assumption of tamed animal spirits.

[28] The only recent exceptions are Fazzari and Gonzalez (2022) and Thompson (2022). Both conclude that the trend is similar to the one obtained in simple Supermultiplier models.

and across the different types of autonomous components of demand (no matter how much they fluctuate), together with the changes in the marginal propensity to consume and the parameters of the propensity to invest, will be the key determinants of the trend of demand-led growth of the economy. This is illustrated by several empirical studies that have tried to analyze demand-led growth precisely in terms of changes in the rates of growth of the various components of autonomous demand and the size of the supermultiplier. Some of these are macroeconomic (Freitas and Dweck, 2013, Morlin, Passos & Pariboni, 2022), or multi-sectoral (Cornelio, Freitas and Busato, 2018) one country demand-led growth decompositions and others study demand inter-relations between countries (Portella-Carbo, 2016; Portella-Carbo and Dejuán, 2019). While others are aggregate Supermultiplier models with econometrically estimated investment functions (Fazzari et al., 2020; Haluska et al., 2021b, Fazzari and Gonzalez, 2022).

3.5 On the exogeneity of the non-capacity creating Autonomous components of demand

On the other hand, some authors argue that autonomous demand must be completely exogenous, in which case the dynamics of growth would be explained only by exogenous variables. This view is shared by Nikiforos (2018) and Blecker and Setterfield (2019). Nikiforos goes as far as to say that "[a]utonomous expenditure is defined as the expenditure that is independent of income and *other economic variables*" (Nikiforos, 2018, p. 660, emphasis added).

First of all, nowhere is non-capacity generating autonomous demand defined as being independent of "other economic variables" (and no other reference is provided for this curious definition) as this would simply make no sense. Obviously autonomous demand components such as residential investment or consumption financed by credit may, for instance, depend on the relevant interest rates, and exports depend on many economic variables such as price and non-price competitiveness and the levels of output and income of other countries. As for autonomous demand being "independent of income", in fact, as shown in section 2 above, it is true that those expenditures are defined as new injections of demand in the circular flow of income that are not the result of the spending of contractual incomes generated by the firms' decision to produce a particular level of output. Thus, from this "financial" point of view such expenditures are thus exogenous. But notice that even business investment, that we consider entirely induced by expected levels and growth of output is also, from the point of view of the circular flow of income "autonomous" in this sense of a new injection of monetary purchasing power, while being endogenous in relation to the level of output through the propensity to invest. This would then raise the interesting question on whether a non-capacity creating component of autonomous demand in this financial sense is also somehow related behaviorally to the level of output and income. And the answer is that some such partial dependence can easily be included in the Supermultiplier framework, as long as the level of output and income are not seen as the *single* determinant of *all* autonomous non-capacity creating demand components of the economy, as this would imply that the whole of aggregate demand is exclusively endogenous to the level of output which, anyway, would be incompatible with the idea that output is determined by demand. Any demand-led growth model will always have at least a part of a demand component that is autonomous and exogenous relative to output. In this sense the Supermultiplier is no different than the usual neo-Kaleckian demand-led models with endogenous utilization. The latter, in fact, assumes that a part of business capacity generating investment is autonomous and exogenous in the long run, assumed to be driven by the "animal spirits" of entrepreneurs. In the case of the Supermultiplier, the autonomous and exogenous part of demand concerns components of demand that do not create productive capacity for the business sector, both because business investment is seen as a derived magnitude given by the competitive pressure to attempt to adjust capacity to the trend of demand and because non-capacity generating expenditures are clearly of a more discretionary nature.

The consequences of including such possible feedback effects between the level of output and some of the components of autonomous non-capacity generating demand can easily be seen in terms of our simple baseline Supermultiplier model, by making Z (taken here to represent total autonomous demand) to depend, in part, on the level of output (measured by a parameter ρ) and, in part, on other variables $\bar{Z}$.

(4) $Z = \bar{Z} + \rho Y$

Replacing the expression above in our equation (3) for the fully adjusted position of economy, we would get:

(5) $Y^{*} = Y = \bar{Z}/(1 - \rho - c - (v/u_n)(d + \bar{z}))$

From the above, we see that the presence of this endogenous element in autonomous non-capacity generating demand increases the marginal propensity to spend and the size of the supermultiplier (and, as we saw above, this would also reduce the rate of growth at which the model is dynamically stable) and the rate of growth of the economy would tend to the rate of growth $\bar{z}$ of the exogenous part of the autonomous non capacity generating demand $\bar{Z}$.

A good example of cases in which something from the financial point of view would be an autonomous non-capacity generating component of demand may become systematically related to the level of output and income and thus endogenous, is when there is some sort of fiscal policy rule. For instance, if the government is required to balance its budget or attain a particular primary surplus (or deficit) as a ratio of aggregate output and income. Under some such rule, government spending may be endogenized if the tax rate (as share of output) is taken as given.[29] Another example would be the so-called repercussion effects on the exports of a large open economy because of the increase of its own level of output. This happens when the increase in output of the large economy increases the level of imports from another economy and this increase in the other economy exports increases its own aggregate demand and output and by its turn its imports from the large economy. The latter, of course, means an increase in the exports of the large economy, that in fact is an indirect effect of its own level of output. Thus, when repercussion effects are present, exports of the large economy are in part and

[29] See Serrano & Pimentel (2019) for examples of Supermultiplier analysis under such rules. See also Ligiéro, Dweck & Freitas, 2021. Note however that even under such type of primary balance rules the level and growth of government spending may still be exogenous if the tax rate is made endogenous to generate the revenue required for the primary balance target (e.g., as in Allain, 2015; and Serrano and Pimentel, 2019, for the case of balanced budget target).

indirectly affected by its level of output (e.g., see Portella-Carbo, 2016; Portella-Carbo and Dejuán, 2019).

Moreover, contrary to Nikiforos (2018) unusual definition of autonomous demand mentioned above, the part of non-capacity creating autonomous demand that is not systematically related with output, $\bar{Z}$, obviously can and is explainable by other economic variables. For example, in Summa (2016) and Serrano, Summa and Moreira (2020), non-capacity creating autonomous demand depends negatively on the real interest rate, reflecting the idea that the monetary policy can influence credit financed expenditures on durable goods consumption and residential investment.[30,31] The same is proposed in Deleidi and Mazzucato (2019), where autonomous consumption depends on the real interest rate. Moreover, they also introduce the idea that Business Expenditures, particularly in R&D, are driven by the entrepreneurial role of the State. Finally, Teixeira & Petrini (2021), and Dejuán and Dejuán-Britriá (2022) also add the influence of speculative credit and house prices on residential investment.

Nikiforos (2018) however goes as far as to say that that "autonomous demand cannot be autonomous in the long period", something very difficult to understand in what regards expenditures such as Government spending, exports or the discretionary consumption of the very rich, for instance, unless one sticks to his own definition that "autonomous" mean independent of both income and any other economic variable. As regards residential investment he asks: "[d]o households make their residential investment decisions without any reference to their (expected lifecycle) income?" (Nikiforos, 2018, p. 668). The simple answer to that is probably no. In fact, applying the reasoning behind equation (4) e (5) above, even if we were to assume a certain degree of systematic dependence of residential

[30] Something with similar results is proposed by Aspromourgos (2007), however in his model the real interest rate affects only the level of output and capacity through changes in the functional income distribution and thus the (super)multiplier. This effect of real interest rate on the multiplier is also present in Serrano, Summa and Moreira (2020) and Freitas and Christianes (2020).

[31] Different from Dutt (2020) that introduces the role of monetary policy in neo-Kaleckian models with autonomous demand, but via the effect of the interest rate over autonomous capacity creating investment and not on autonomous consumption.

investment on *current* income and output, this could be easily incorporated in the Supermultiplier framework.[32]

3.6 Financial constraints in the Supermultiplier model

Critics such as Nikiforos (2018) seem to suggest that in the Supermultiplier model the non-capacity creating autonomous demand and also output and capacity expansion are unconstrained and could grow indefinitely at a constant rate.[33] This type of criticism, while surprisingly common, is not very relevant, as it could in principle be equally applied to any growth model in which the determinants of a particular rate of growth is taken as given. However, discussing this topic gives us a chance to clarify the various factors that may limit or constrain the growth rate of autonomous demand or output in Supermultiplier growth models. Again, as we discussed in the baseline model (sub-section 2.4 above), autonomous demand (also output and capacity expansion) is supposed to grow at a particular given rate. This baseline version of the model also assumes that the economy is closed and supposes that the economy's growth is not constrained by the availability of labor (like most non-neoclassical growth models). It is also assumed that besides non-capacity creating autonomous demand, the economy grows at such a given rate. As regards the latter (as in most demand-led growth models) it is assumed that the Central Bank sets the basic interest rate exogenously and banks create enough endogenous credit money to allow the economy to expand at that rate. And regarding the former, autonomous demand is expanding at that particular rate precisely because financing is

[32] Assumptions on the possible feedbacks between output and those expenditures should reflect some specific historical and/or institutional contexts and then incorporated in specific versions of the Supermultiplier model. In this regard it is important to notice that in recent empirical work on the Supermultiplier the issue of the degree of exogeneity of different autonomous components of demand is being dealt with, since this is important for econometric reasons. See Girardi and Pariboni (2016, 2020), Haluska, Braga and Summa (2021) and Perez-Montiel and Manera (2020, 2022).

[33] In his own words: "[i]n the long run, expenditure decisions become endogenous to stabilize the debt-to-income ratios." (Nikiforos, 2018, p. 670), and "[w]hat about exports? If a country experiences a negative export shock, then we are in a situation of a continuous accumulation of net foreign liabilities, which eventually will trigger an endogenous adjustment." (idem).

assumed to be available. If such availability decreases for some reason, autonomous demand growth would also decrease. In fact, some of the specific reasons why the expansion of some components of autonomous demand may be hindered by financial constraints have been dealt with in the literature.

In reality, the process of autonomous demand growth is not always smooth and there are possible feedbacks from indebtedness to autonomous demand expansion that may affect its pace of growth. We agree with Hein and Woodgate (2021) that "[a] systematic examination of the potential limits generated from the monetary and financial side to the sustainability of autonomous demand growth would thus seem desirable" (Hein and Woodgate, 2021, p. 380).[34] In fact, some recent work has started to explore the dynamics and the role of different types of debt in the Supermultiplier model. The general result is that when there is only one kind of autonomous expenditure financed by credit, if the growth rate of this autonomous expenditure increases, the ratio of debt to aggregate income decreases.[35] This happen because there is a level effect on output arising from a higher investment share related to a sustained higher growth rate, which increases the Supermultiplier. This result, considering worker´s autonomous consumption as the only autonomous demand component and concerning the worker's debt to wage income relation was shown by Pariboni (2016) and confirmed within a Stock-Flow Consistent (SFC) model by Mandarino at al. (2020). The same result was found by Teixeira and Petrini (2021) for residential investment and households' debt also within an SFC model. Freitas and Christianes (2020) show that the same result is valid for the public debt to output relation if only government spending is considered.[36] With more than one

[34] Here we can mention that there is a difference between institutional sectors, as Government spending faces no purely financial constraint in its own national currency, as we know form the basic principles of functional finance (e.g., see Summa 2022), while non-financial firms do face financial constraints but are much less prone to be financially constrained than wage earners.

[35] Dutt (2020) obtains the result that the growth rate of government expenditure decreases the debt to capital relation, and the same is valid for an increase in the wage share. Hein and Woodgate (2021) also obtain the negative relation between growth and debt to capital ratio.

[36] Aspromorgous (2014) analyzed the public debt sustainability condition using a Supermultiplier model in which the government expenditure growth rate is made equal to an assumed exogenous natural rate of growth to prevent unemployment from increasing. Given the interest rate, the natural rate of growth and

autonomous demand component these results change and interest rates and income distribution matter for the different debt to income ratios, as shown in Pedrosa, Brochier and Freitas (2022), who, besides public debt, also analyze the debts of the household sector. Moreover, different results can be obtained if different private and government components of autonomous demand grow at different rates, as shown in Freitas and Christianes (2020) and Ligiéro et al. (2021).

One important lesson that can be derived from this research in progress is about the interdependence of the components of autonomous expenditures.[37] For example, if government expenditures start growing less than autonomous consumption, the result will be an increasing debt-to-income relation for the household sector. Hence austerity policies of low growth in government spending can have further negative effects on demand-led growth if these effects on the debt-to-income ratio of households lead to the imposition of credit constraints by banks, slowing the growth rate of autonomous consumption (and/or, by a similar reasoning, the residential investment). And obviously a concomitant interest rate rise due to a tightening of monetary policy could make things worse. On the other hand, an increase in the growth rate of government expenditures can help to stabilize the growth of private autonomous demand by reducing the debt-to-income ratios in the household sector. In summary, changes in specific sectoral debt-to-income ratio may lead to financial constraints to the growth rate of a specific component of aggregate demand. This does not mean that "autonomous expenditure stops being

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the tax burden, the share of government expenditure over income is determined to achieve an exogenously determined public debt-to-income target.

[37] This reference can be very useful to understand concrete experiences such as the boom driven by autonomous demand in the Brazilian Economy in the 2000s (Serrano and Summa, 2015) in which first exports, government transfers and durable goods consumption start growing more, reinforced by Government Investment and Housing, and finally private investment, with the consequent rise in the private productive investment share of output. Or the US post-war experience as shown in Fiebiger (2018) and Fiebiger and Lavoie (2019) or the stagnation and lower investment share in the US economy in the aftermath of the great financial crisis (Cynamon and Fazzari, 2017), to which we also add the changes in the supermutiplier (for example, related to distribution, import coefficients or tax burden) are important.

autonomous" (Nikiforos, p.669), just that some autonomous components of aggregate demand may sometimes face financial constraints.[38,39]

3.7. Real resource constraints to the Supermultiplier model

The idea that growth would be somehow unconstrained in Supermultiplier models is clearly at odds with the explicit upper supply-side constraints on the feasible rates of demand-led growth present in all model versions. Growth in the Supermultiplier model can be constrained by capital if the economy expands too fast, as there is a maximum rate of growth that is compatible with a demand-led regime. This comes from the fact that output can only be demand-led if the marginal propensity to spend is smaller than one in both as a trend and during the adjustment process and that the marginal propensity to spend depends on the growth rate of output as it affects induced investment share. This constraint in practice would probably be binding for very high rates of growth of demand, as induced investment reacts only gradually to changes in the actual growth rate of the economy (Moreira and Serrano, 2019), and leakages from high-profit shares are substantial, as are the significant leakages from taxes and imports in open economy models with a government sector (Haluska et al., 2021a).

[38] We also think the specific criticism by Nikiforos that the Supermultiplier model is incompatible with Minskyan/Kindleberger crisis is not so fair. From a survey in Nikolaidi and Stockhammer (2017) about Minskyan models it becomes clear that all of them involves much more assumptions over other variables (like for example endogenous interest rates) than the baseline Supermultiplier model. We believe that exploring the heterogeneity of growth rates and interest rates between institutional sectors can be a way to advance on this research on financial fragility within the Supermultiplier model. It is worth pointing out that bubbles and crisis will not to be neutral if they affect persistently and asymmetrically the autonomous demand growth, as we discussed in footnote 21.

[39] In fact, it is not clear even Minsky theory of financial instability is able to generate an endogenous financial crisis since retained profits also increase when the economy increases (Lavoie, 2020). Anyway, the proposal to extend Minsky to the residential investment (Serrano, 2004, Lavoie, 2020, Fazzari, 2022) seems to be more related with the Supermultiplier theory than with productive investment. Some possibilities of this kind of dynamics can be explored in a SFC Supermultiplier model with residential investment (e.g., Petrini and Teixeira, 2021).

As regards a possible labor constraint, Garegnani (1990) has discussed, from a Sraffian standpoint, the process by means of which the size of the labor force in the long run usually tends to adjust itself endogenously to the size of employment opportunities generated by demand-led growth in capitalist economies through various mechanisms involving migration, changes in participation rates and changes in the size of the informal sector. Some simplified aspects of these processes have been dealt with in the Supermultiplier literature as explanation of the endogeneity of the so-called natural rate of growth, i.e., the sum of the rate of growth of labor productivity and the growth of the labor force. In these studies, it is realistically assumed that productivity growth depends in part on the rate of growth of the economy and the capital stock, as technical change tends to be embodied, following some version of the so-called Kaldor-Verdoorn law. Some of these contributions add, although from our viewpoint implausibly, that the rate of growth of labor productivity is also a definite positive function of the rate of employment (through some mechanism connecting higher real wages to "induced innovation" in the sense of Hicks).[40] Palley (2019) and Fazzari et al. (2020) add to this an equation for the rate of growth of the labor force that has an exogenous component and an endogenous mechanism according to which the rate of growth of the labor force is a positive function of the rate of employment (and a negative function of the rate of unemployment). The latter generates a definite long-run negative relationship between the rate of demand-led economic growth and the unemployment (employment) rate. And as the latter cannot go below a definite minimum, this minimum unemployment rate is associated with a maximum rate of demand-led growth, beyond which there will be labor scarcity.[41]

Nah and Lavoie (2019a and 2019b) formalize labor productivity growth along similar lines but assume the rate of growth of the labor force to be completely endogenous and equal to the difference between the rate of growth of the economy minus the (endogenous rate) of productivity growth. In Serrano (2019), labor productivity and labor force growth

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[40] For a critique of this concept of technical change see Bruegger and Gherke (2017).

[41] Fazzari et al. (2020) also run some simulations with actual data and estimated parameters for the US economy to show that the model seems to face no labor supply constraints for a reasonable range of growth rate of demand and parameters, as the unemployment remains within a reasonable range.

are also endogenous but do not include Hicskian induced technical change. And in contrast with Fazzari et al. (2020) and Palley (2019), in Serrano (2019) the rate of growth of the labor force adjusts with a long lag to the growth of employment, but this rate of growth is not functionally related to the unemployment rate. Consequently, in this formulation, any change (including the temporary ones) in the rate of growth of demand-led growth leads to a change in the longer run unemployment rate, such that there is not unique longer run relation between the rate of growth of the economy and the level of the employment (unemployment) rate.

3.8 Balance of payments and other policy constraints on demand-led growth

Given that, as we have just seen, according to the Supermultiplier, demand-led growth usually leads to the endogenous increase in the availability of both labor and capital (through induced investment). Thus, the pace at which the economy grows tends to be limited by the economic policy regime that may contribute to increasing or hindering the expansion of autonomous demand and the economy as a whole.

The best known of these policy constraints, particularly for developing countries, is the balance of payments constraint. When this constraint is binding, the government will have to take measures to slow down the growth of demand to control the loss of foreign reserves and guarantee the sustainability of the path of the external debt (in foreign currency) of the economy, as discussed in Bhering et al. (2019), Dvoskin and Torchinsky (2022), and Morlin (2022).[42]

[42]We think that by separating the effective growth and the determinants of external constraint can be more accurate than the remark made by Oreiro et al. (2020, pp. 256) that "the SSM approach can be only applied to the case of an export-led growth regime". First, because although it is obviously true that an open economy will face external difficulties to finance a current account deficit and to pay for the service of the debt if the growth rate of output is indefinitely higher than the growth rate of exports (this result is valid for growth models in general, supply or demand-led), yet this is not necessarily true for the short and medium run (due to previous levels of accumulated international reserves and/or different international financing

But growth may also be constrained by several institutional economic policy rules, particularly fiscal policy. The need to comply with such may be central to understanding the rate at which government spending and transfers, very important determinants of autonomous demand, are allowed to grow not only in the short run but also for longer periods, and this cannot fail to have significant impacts on the pace of private induced investment. This is an essential topic in the growing Supermultiplier literature, and many contributions are now available. Among them, Allain (2015) and Serrano and Pimentel (2019) examined long-run growth under balanced budget rules, and Freitas and Christianes (2020) and Aspromourgos (2014) looked at internal debt sustainability issues. Dutt (2019) and Ligiéro, Dweck & Freitas (2021) deal with rules requiring primary surpluses. Morlin (2022) discuss fiscal rules to simultaneously stabilize internal and external debt. Finally, Serrano and Braga (2022) discuss rules for planning the expansion of government spending and a possible cap on interest payments on public debt, just to give some examples. In all these papers, the central theme is that the rate at which the economy will grow even in the long run will not be independent of the rules and targets set for fiscal policy.

Other important policy constraints on demand-led growth following the Supermultiplier approach may come from the perceived need to control conflict or cost-push inflation, whether or not a formal inflation targeting regime is adopted. As an example of this type of policy constraint on growth, Serrano (2019) combined a conflict-augmented Phillips curve with a simple Supemultiplier model[43] (see also Lavoie and Nah, 2019b in this respect) to show that policies of controlling demand to generate enough unemployment to moderate wage claims may have permanent negative effects on the long run rate of growth of both actual and potential output. Note that this kind of policy constraint will impact the economy depending on the effect of an unemployment reduction on the

conditions). Second, because the concept of export-led growth itself is ambiguous in the literature (Medeiros and Trebat, 2016).

[43] For more details and a comparison with the conflicting claims heterodox NAIRU view, see Summa and Braga (2020).

relative bargaining power of the different social classes, even if there is no sign of real scarcity.

The resulting conflict inflation can be incompatible with the inflation target. In this connection, Summa (2016) introduces inflation targeting in a Supermultiplier model to show that the chosen target by the Central Bank is not neutral to growth in an economy open to capital flows and the effects of monetary policy on exchange rate dynamics and its impacts on conflict inflation. An interesting result from this analysis is that a lowering of the target for the rate of inflation will require higher nominal and real interest rates that will affect distribution and slow down the expansion of an interest-sensitive autonomous demand component, reducing long-run growth. Moreover, an adverse external shock may lead to slower growth of demand (and output) to meet the inflation target, even if the economy is still far from its usual external constraint.

We consider the analysis of policy-constrained growth using Supermultiplier models as the most promising route to analyze the impact of political and social forces and institutional aspects on economic growth (c.f., in particular, Morlin, Passos & Pariboni, 2022). This runs contrary to those who think such issues can only be dealt with if a direct systematic impact of some measure of profitability on business investment of firms is postulated or by arguing that the long-run trend of private business investment is governed by some loosely defined entrepreneurial "animal spirits."[44] But as we saw in section 2 above, there are good theoretical and empirical reasons to view business investment as determined by expected effective demand and that there are no general necessary theoretical relations between the growth of effective demand and income distribution.[45]

[44] According to Michl (2009) "Treating all investment as induced by demand growth demotes the entrepreneur to a supporting role in the drama of accumulation, while elevating the rentiers and politicians who control private and public autonomous consumption to the status of prime movers". But as we saw, 'politicians' in the end are influenced by both entrepreneurs, rentiers and workers, and also autonomous consumption can be influenced by the institutional framework and economic policy influenced by entrepreneurs, rentiers and workers, turning the idea of managing growth a little bit more complex.

[45]Even less in this theory there is such a systematic relation between wealth inequality and growth, as proposed by Oreiro et al (2020, pp. 522) "if capitalist consumption is the engine of long run growth, then the higher is the concentration of wealth (not necessarily income) on the hands of capitalists higher will be the expected long run growth, since higher should be the rate of growth of capitalists' consumption." In

Further, there is also good evidence of direct effects of political forces and class conflicts on the decisions concerning the rules and the stance of the government's economic policies. Thus, the analysis of policy-constrained growth may lead to a more satisfactory discussion of the political economy of growth (and stagnation) along the lines suggested by Kalecki (1943 and 1971), Steindl (1979), and Cavalieri, Garegnani & Lucci (2008).

Note, however, that this openness of the analysis based on the Supermultiplier for dealing with different institutional and political elements derives directly from the fact that, in the mechanism of the model, the levels and growth of autonomous demand are "exogenous," instead of being reduced to a single mechanical rule. However, this feature, which we consider a positive feature of the model, seems not to have been grasped by some commentators.

Indeed, according to Nikiforos (2018, p. 667), the idea that growth follows the expansion of autonomous non-capacity generating demand is criticized as being a 'strange choice' and "[in]consistent with the ideas of classical political economists and Keynes on the dynamics of capitalism" as the economy tends towards what he calls an "exogenously determined, "natural" growth rates," which is itself "rather strange," given that as we saw above the "natural growth rate" is fully endogenous in this type of model. Setterfield and Blecker, by their turn, say that somehow Supermultiplier models are also a sort of exogenous growth model: "The equilibrium rate of growth in supermultiplier models is an exogenous given, meaning that what this class of models has created is a new class of heterodox exogenous growth models" (Blecker and Setterfield, p. 365). They seem to have meant this in a negative sense, but as explained above we take this as a compliment.

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this respect, we would like to point out that from the Supermultiplier perspective (i) autonomous consumption is not the only source of autonomous expenditure; (ii) autonomous consumption can include workers autonomous consumption (and residential investment).

4 Final Remarks

In this paper we have argued the recent criticisms to the demand-led Supermultiplier models seem to be actually addressed to a number of unessential simplifying assumptions of the baseline version of the model or due to particularly restrictive definitions and interpretations of the concepts of induced investment and non-capacity creating autonomous demand. We took a step back to clarify what we called *Supermultiplier* **theory** to show in the broad theoretical generality, as well as the empirical relevance of the two key notions upon which the Supermultiplier is based, namely, non-capacity creating autonomous demand and induced investment, the latter itself being based in the general capital stock adjustment principle and the associated tendency of capacity to adjust to the trend of demand. This explanation of business investment, which has always been favored by empirical evidence and the Supermultiplier model is for us a useful tool to draw the theory's important long run implications. As we have shown in the paper, many theoretical applications have been developed recently, consisting of different versions of the Supermultiplier model that have included more detailed and realistic specifications and extensions of the simple baseline model, without changing its basic results and main properties of the Supermultiplier. Of particular interest to us, is to understand how the Supermultiplier model has been shown to provide a useful tool for both the theoretical and empirical analysis of what we call policy constrained demand-led growth in both advanced and developing countries. We think that this research agenda on policy-constrained demand-led growth can be a very promising way to contribute to bridge the gap between the short run analyses of macroeconomic policies and the longer run dynamics of growth, not only of output but more importantly of investment and potential output.

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