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**Autonomous Demand and Capital Accumulation: Three
Essays on Heterodox Growth Theory**

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Introductory chapter

Subject of this thesis is modern heterodox growth theory. The three essays will critically discuss some controversial issues in the current literature and develop a specific approach named, after Serrano (1995, 1996), the Sraffian-Supermultiplier.

In this introduction, I shall locate the above contributions within the current debate. In addition, I will briefly illustrate the content of the essays.

It is possible to move from a broad distinction between two alternative approaches to the theory of economic growth. According to the first, which is dominant in the academy, *“actual output tends to adjust to potential output, or productive capacity, rather than the other way round”* (Kurz, 1994, p. 405), while demand does not exert any independent role. In a nutshell, this is the main message of Neoclassical growth theory. Running the risk of over-simplification, we can identify two main positions within this approach: (i) in Solow's model (Solow, 1956), output growth is driven by the exogenous growth of population and by technical progress; (ii) according to Endogenous Growth Theory¹, on the other hand, (endogenous) preferences of utility-maximizing individuals determine the community's propensity to save, affect the pattern of technical progress and are the key factor in explaining capital accumulation and output growth. In both cases, as long as the economy does not suffer from external disturbances - like for example attempts by the public authorities to perform demand management - which hinder a smooth functioning of the market system, the long-run pattern of output tends to converge to a full-employment path: the mechanism of supply and demand, based on factor substitutability,

¹ See for example Lucas (1988).

allows the adaptation of investment to full-capacity savings.²

The second approach maintains that aggregate demand, both in the short and in the long-run, determines actual output, while potential output tends to adjust to actual output. In particular, investment generates the correspondent, necessary amount of savings by prompting the required change in output.³ There is no automatic mechanism warranting that the equilibrium level of output is consistent with the full-employment of resources and unemployment is considered as a structural feature of capitalist economies.

The three essays that compose the thesis will develop some aspects of the second point of view. For this purpose, I will take inspiration from the works of Sraffa, Keynes and Kalecki. At a first glance, the inclusion of the Italian economist in this list can appear surprising, considering that he never dealt explicitly with problems related to economic growth. Nonetheless, the issues discussed by Sraffa have a major impact on some central questions in growth theory, in particular on the role of aggregate demand.

As Kurz puts it:

(Sraffa) was able to show that the conventional neoclassical theory of distribution is flawed: the rate of profits cannot generally be conceived 'the price' that equilibrates the supply of and demand for a factor called 'capital'. *A fortiori* the rate of interest cannot generally be considered as the factor that equilibrates saving and investment. This is, however, the centre piece of conventional neoclassical analysis that maintains that there is no problem of effective demand, i.e.,

2 See Garegnani (1978), Kurz (1994), Cesaratto (1999) and Petri (2004) for a critical discussion.

3 If we imagine for example a rise in investment, the higher output is produced, in the short-run, utilizing more intensively the existing stock of capital. In the long-run, it is productive capacity which adjusts to the higher aggregate demand.

'Say's Law' holds.

(Kurz, 1994, pp. 417-418)

In this way Sraffa⁴ paved the way for the development of an alternative approach, based on the principle of effective demand. Moreover, it provided solid arguments to show that *“the Keynesian results are not confined to the short period, but apply with equal force to the long period”* (Cesaratto and Mongiovi, 2015, p. 104).

This will not be, however, the only aspect of Sraffa's legacy taken into account in the present work. I will also rely on Sraffa's (and Garegnani's) contribution to the revival of the Classical Surplus approach. In particular, in this thesis, I will consider income distribution as exogenously determined by the bargaining power of social classes and by institutional and customary elements, in the tradition of Classical analysis (see Pivetti, 1991 and Stirati, 1994). Characteristic of this tradition is that - contrary to the simultaneous determination of real wage, rate of profit, relative prices and output proper of Neoclassical theory - according to Smith, Ricardo and Marx, the determinations of income shares and levels of output belong to two distinct logical-stages⁵ (see Garegnani, 1984, 1990), as can be summarized by the equation:

$$\text{Net social product} - \text{aggregate wages} = \text{shares other than wages} \quad (1)$$

4 For an exhaustive discussion of the Sraffian critique to the Marginalist treatment of the productive factor 'capital', on which basis we can reject the Neoclassical claim of a natural tendency of the economies towards supply-side determined equilibria, see Harcourt (1972), Petri (2004) and Lazzarini (2008).

5 As Garegnani makes clear, this does not imply denying the existence of multiple channels of influences between the elements determined in the two different stages, but simply that, between these magnitudes, exist relations that are “so complex and variable according to circumstances as to allow not for general quantitative relations of sufficiently definite form.” (Garegnani, 1990, pp. 123-124).

presented in Garegnani (1990, p. 122), which expresses the shares other than wages “as the difference between a known net social product and the known part of the product that constitutes wages – as ‘the surplus’, that is, that the social product shows over and above wages” (ibid., p. 122).

It is of fundamental importance and source of inspiration for this thesis also the Kaleckian attempt to develop the Marxian analysis of the problem of realization of capitalists' surplus, combining it with an explanation of output trends in terms of an independent evolution of aggregate demand.⁶

As said, I will circumscribe my attention to the “alternative” approaches to economic growth. A considerable degree of disagreement is, however, present among those scholars who explain the long-run pattern of output in terms of the principle of effective demand. More specifically, I shall argue below that there are several reasons not to be fully satisfied with the so-called Neo-Kaleckian model of growth and distribution, which is nowadays, perhaps, the most influential non-Neoclassical theoretical contribution to the topics under discussion. On the constructive side, the present work will propose the Sraffian-Supermultiplier model as a more valid alternative.

In the remaining of this introduction, I shall briefly introduce the two competing positions described above, the Neo-Kaleckian and the Sraffian-Supermultiplier. It is, however, useful to move from the natural departing point of all modern growth theory, the Harrod model.

6 See Kalecki (1967), Serrano (2008) and Cesaratto (2015).

Harrod's model and the instability issue

The ideas and the methodologies put forward in Roy Harrod's "An Essay in Dynamic Theory" (1939) can be considered as the first contributions to the development of modern growth theory, being object of endless but thought-provoking controversies. For this reason, Harrod's work is a useful starting point for any discussion concerning growth theory. Indeed, in a sense, all the streams of modern growth theory can be regarded as an attempt to deal with some Harrodian puzzles.⁷

As it is well known, Harrod's main novelty is represented by the so-called "*Fundamental Equation (constituted by) the marriage of the acceleration principle and the multiplier theory*" (Harrod, 1939, pp. 16-17), from which the "*warranted rate*" can be derived. Recalling that, in Harrod, investment is induced by expected output growth and responds to over(under)-utilization of the existing productive capacity, from the equilibrium condition $I = S$ we obtain

$$g^k = \frac{su}{v} \quad .^8 \text{ A warranted rate has to be characterized by a degree of capacity}$$

utilization equal to the normal, desired one, with $Y = Y_n$ and $u = u_n = 1$, which

leaves us with $g_w = \frac{S}{v}$ (ibid., p. 18). The warranted rate is indeed described as

7 In a Neoclassical framework, Solow's growth model (Solow, 1956) provides a solution to Harrodian instability, based on Neoclassical factor substitutability. For a discussion of some serious theoretical problems present in Solow and in other Neoclassical contributions elaborating on Harrod's inspiration, see for example Cesaratto (1999) and Petri (2004).

8 From $I = S$, we can divide both terms by K , the stock of capital, obtaining $I/K = g^k = S/K$. With some further manipulations, we have that $g^k = \frac{S}{Y} \frac{Y_n}{K} \frac{Y}{Y_n}$. Assuming the average propensity to save (S/Y) to be equal to the marginal one (s), K/Y_n being equal to the normal capital-output ratio v and Y/Y_n defining the actual degree of capacity utilization u , we get $g^k = su/v$.

That rate of growth which, if it occurs, will leave all parties satisfied that they have produced neither more nor less than the right amount. Or, to state the matter otherwise, it will put them into a frame of mind which will cause them to give such orders as will maintain the same rate of growth.

(ibid., p. 16)

Harrod pointed out that such an equilibrium is unstable.⁹ Unless expectations lead entrepreneurs, by a fluke, to accumulate exactly at g_w any other investment decision engenders cumulative disequilibria. A rate of accumulation higher than g_w will manifest itself as a level of capital utilization higher than u_n . But in a situation like this

Producers on balance will not feel that they have produced or ordered too much; on the contrary, they will be running short of stocks and/or equipment. Thus will not feel that they have produced the warranted amount plus something; on the contrary, they will feel that everything which they have produced has been warranted, and that they might warrantably have produced something more.

(ibid., p. 24)

A production "*unwarrantably large*"¹⁰, caused by over-optimistic growth expectations, will appear to entrepreneurs as under-production ($u > u_n$),

9 According to Harrod, instability is a normal characteristic of any dynamic equilibrium, contrary to static equilibria, which he considered as generally stable.

10 With this expression, Harrod refers to a production greater than "the unique amount which would leave them (the producers) on balance satisfied with what they had done and prepared to go forward in the next period on similar lines" (Harrod, 1939, p. 24).

triggering another increase in the actual rate of accumulation and a further departure from the warranted rate.

Since then, the attempt to escape from Harroddian instability has been one of the main challenges faced by growth models, both in the Neoclassical and in the Classical-Keynesian tradition.

Income distribution and the Cambridge equation

A first generation of Post-Keynesian models¹¹, commonly known as the Cambridge growth model, was apparently able to circumvent the problem posed by Harroddian instability. In these models, an increase (decrease) in the rate of accumulation is accommodated by an endogenous shift in income distribution in favor of capitalists (workers).¹² From the investment-saving equality, with the further assumption that only capitalists save, it is possible to derive the so-called Cambridge equation: $g^K = s_\pi r$, where g^K is the rate of accumulation, s_π the marginal propensity to save out of profits and r the profit rate.

As pointed out in Garegnani (1992), there are two possible ways to interpret the functioning of Cambridge equation. According to the first one, which seems to be endorsed by the original proponents of the Cambridge growth model, the profit rate on the right hand side of the Cambridge equation is interpreted as the normal profit rate and the equation postulates a causal relation from the rate of accumulation to normal income distribution. Since productive capacity is assumed to be utilized *continuously* at its normal degree,

11 See for example Robinson (1962).

12 For a comprehensive discussion of the theoretical problems raised by the Cambridge growth model, see Ciccone (1986).

as it is done for example in Robinson (1962), the level of income obtainable per unit of capital in the long-run is regarded as quite rigid. Hence, capacity output is assumed to determine actual output and aggregate demand has to adjust to the latter, in order to attain the investment-saving equilibrium. In this view, an acceleration in accumulation, due for instance to greater optimism about expected demand, prompts an increase in the price level. In the face of rigid nominal wages, this causes a reduction in the wage share and a shift in income distribution in favor of profits, which generates the correspondent increased amount of savings, given the capitalists' higher propensity to save.

On the contrary, according to the second interpretation proposed by Garegnani, r in the Cambridge equation corresponds to the actual, ex-post, realized rate of profit. Garegnani stresses that in the long-run, when new productive capacity can be built and installed, production is more flexible and not more rigid, as Robinson believed. New demand can be accommodated, at first, by a more intensive use of the existing productive capacity.¹³ As it is made clear by the decomposition of the rate of profit as the product of the profit share, the degree of capacity utilization and the inverse of the normal capital-output ratio ($r = \Pi u/v$), this implies an increase in r . But, as Garegnani notices, this rate of profit has in principle nothing to do with the normal one, the variable that together with the real wage constitutes “*distribution in the relevant sense*” (Garegnani, 1992, p. 60). Indeed, “*it is with respect to decisions to invest that the concept of a rate of return or rate of profits on capital acquires relevance*” (ibid., p. 60). Capitalists invest to endow themselves with the capacity necessary to produce the amount they expect to be demanded and it is reasonable to assume that their purpose is to produce these quantities in the most efficient way. In

13 In the long-run, the entrepreneurs will attempt to accommodate the productive capacity to demand, through variations in their investment.

other words, they aim at building new plants to be run at their normal, desired level. It follows from this that the expected rate of profit to be obtained on *new* investments is the normal rate, with which the rate of accumulation holds no necessary causal relation, contrary to what is maintained by the proponents of the Cambridge growth model.

The first interpretation of the Cambridge equation - which establishes a causal relation from the rate of accumulation to normal distribution - and the Classical approach endorsed in this work are clearly incompatible. Moreover, the postulated negative relation between the rate of accumulation and wages does not seem to be backed by empirical evidence¹⁴. For these reasons, I will adopt the second view proposed by Garegnani, according to which the higher savings required by an increased rate of accumulation are generated, when the productive capacity is given, by a more intensive utilization of the existing stock of capital. The resulting higher degree of capacity utilization generates a higher, actual rate of profit, which has not to be confused with the normal rate of profit.

A simple Neo-Kaleckian model of growth and distribution

The Neo-Kaleckian model of growth and distribution, inspired by the seminal works of Kalecki and Steindl¹⁵ and whose first formalizations trace back to Del Monte (1975) and Rowthorn (1981), is nowadays quite influential among heterodox scholars. Its main feature is represented by the fact that the degree of capacity utilization is endogenous not only in the short but also in the long-run. Due to this element and in contrast with the older Cambridge equation-based models, income distribution is no longer the accommodating variable of

14 See Stirati (2015) for an exhaustive discussion.

15 See for example Kalecki (1971) and Steindl (1952).

changes in the rate of accumulation.

A basic Neo-Kaleckian model of a closed economy without public sector, based on Amadeo (1986), consists of three fundamental equations:

- the profit rate identity $r \equiv \left(\frac{P}{Y}\right)\left(\frac{Y}{Y_n}\right)\left(\frac{Y_n}{K}\right) \equiv \Pi \frac{u}{v}$ (2)

- the saving function $g^s = sr$ (3)

- the accumulation function $g^k = \alpha + \beta(u - u_n)$ (4)

where α can be considered as the investors' assessed trend growth of sales and β is a parameter ($\beta < 1$) that represents the velocity with which entrepreneurs react to discrepancies of the actual from the normal level of capacity utilization. From the equilibrium condition in the goods market ($I=S$), we derive the equilibrium degree of capacity utilization:

$$u^{eq} = \frac{\alpha - \beta u_n}{s \frac{\Pi}{v} - \beta} \quad (4)$$

Since very early, various scholars (Committeri, 1986; Auerbach and Skott, 1988) have highlighted the unsatisfactory nature of a long-run growth model with an equilibrium degree of capacity utilization different from the desired, normal one. Moreover, as admitted by Hein et al. (2011, p. 592), it is reasonable to assume that entrepreneurs have adaptive expectations and revise their assessed growth rate as long as this diverges, for a certain span of time, from the actual growth rate of the economy. In terms of the basic Neo-Kaleckian model introduced, this implies that a discrepancy of u from u_n gives rise to a variation of the same sign of the parameter α , but this poses a serious problem to the model in terms of Harrodian instability.

Adding to the previous equations the adjustment process given by:

$$\Delta\alpha = \theta(u^{\text{eq}} - u_n), \quad \theta > 0 \quad (5)$$

it is possible to provide a simple graphical representation.

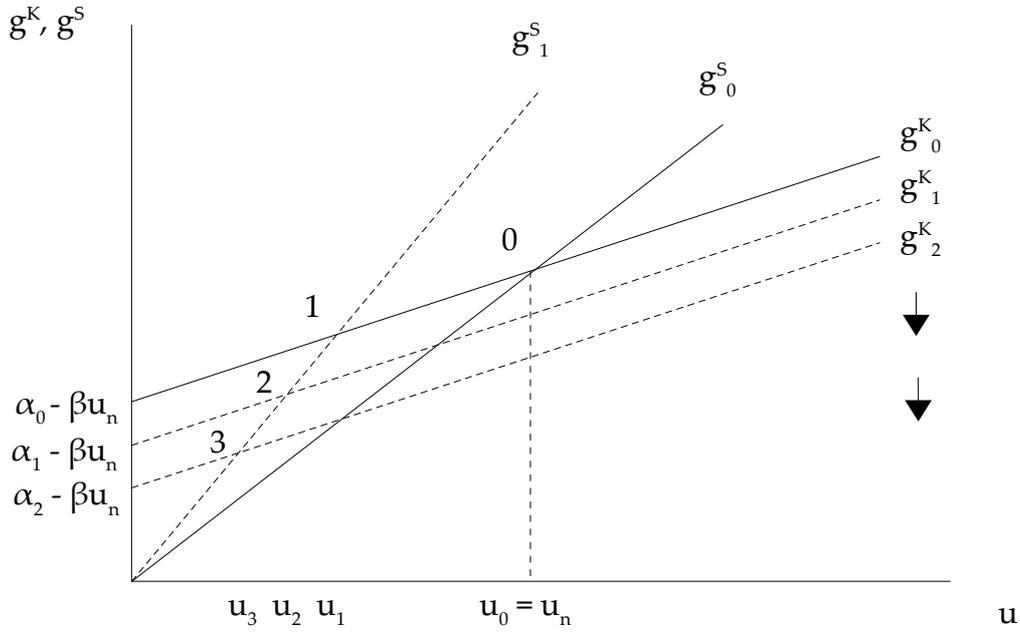


Figure 1: The effects of an increase in the marginal propensity to save in a baseline Neo-Kaleckian model with adaptive expectations.

We can imagine to begin with a situation described by the two curves g^K_0 and g^S_0 , relative to equations (3) and (4), and assume that $u_0 = u_n$. If, for any reason, there is an increase in the marginal propensity to save s , the saving function rotates leftward and the new equilibrium, located in point 1, is characterized by $u_1 < u_n$. This new, reduced level of the degree of capacity utilization is likely to trigger a revision in the long-run entrepreneurs' growth expectations, with a reduction in the parameter α (from α_0 to α_1) which causes a further diminution in u (from u_1 to u_2 , point 2). Following the logic of the model, this process can in

principle go on indefinitely, until u approaches 0^{16} , resembling the centrifugal forces governing the out-of-equilibrium dynamics in Harrod's original model and giving rise precisely to Harrodian instability.

Hein et al. (2012) review and summarize various Neo-Kaleckian attempts to cope with the problem. The three main proposals are:

- 1) There is not a single desired degree of capacity utilization but it is more reasonable to think in terms of a range of acceptable values for this variable. If this is the case, any provisional equilibrium (with this term they refer to a point like 1 in Figure 1, where $u \neq u_n$) that falls within the admissible range can be treated as a long-run fully adjusted position, where no incentive for a change in the accumulation behavior is at work. It is however unclear what happens if a change in some exogenous parameter displaces the provisional equilibrium outside the aforementioned range. The authors also add, in a somehow obscure vein, that "*given real-world uncertainty and the fact that the capital decisions are irreversible to a large extent, firms may be very prudent, so that the Harrodian instability may not be a true concern in actual economies*" (ibid., p. 147). Nonetheless, even if firms are prudent and, once in equilibrium, tend to stick to it, one can ask how they get to the warranted path in the first place, given that a small divergence from it would lead entrepreneurs elsewhere (as noted by Kalecki, 1967; see also Cesaratto, 2015).
- 2) There are competing targets within the firm, which is characterized by conflicts of interests among social groups: between shareholders and

16 In the case of a decrease in s , the economy would experiment an explosive dynamics with a continuous increase in the degree of the capacity utilization, until it approaches the ceiling represented by full utilization.

managers on the one side against workers on the other but also between shareholders and managers. For this reason “*the equality of actual and normal rates of capacity utilization should not be treated as the (only possible) long-run equilibrium condition*” (ibid., p. 154). Even if it appears perfectly reasonable to maintain that the equality between u and u_n does not include all the requirements of a long-run equilibrium, it is not obvious why distributional internal conflicts should prevent firms from trying to adjust the utilization of their capacity to the level they consider preferable. The Classical treatment of income distribution, endorsed by the Supermultiplier approach, takes into account the conflictual nature of capitalist production and of the related distribution of the social product without any need to resort to similar assumptions.

The claim according to which “*the long-run endogeneity of the utilization rate helps to reconcile the conflicting claims of capitalists and workers*” (ibid., 154) appears questionable as well. Cavalieri, Garegnani and Lucii (2004) criticize an analogous view, which informs the interpretation of the Golden Age of capitalism – proposed by the Neo-Kaleckian authors Marglin and Bhaduri¹⁷ – as a period of coincidence of interests between capitalists and workers. As Cavalieri et al. make clear, it is indisputable that the Golden Age period of high wages, which led to a rise in aggregate demand and consequently in the degree of capacity utilization, caused an increase in the realized rate of profit. But the win-win nature of such a situation is only apparent. The rate of profit relevant for capitalists is the normal one, which has an inverse relation to the real wage and that is calculated under the hypothesis of normal utilization.

17 See Marglin and Bhaduri (1990).

Cavalieri et al. point out that, during the periods of real wage increases proper of the Golden Age, the normal rate of profit – the one relevant to assess the profitability of investment decisions – actually fell. As a result it can be concluded that, even during the Golden Age, the presumed cooperative capitalism cannot be claimed as a justification for a discrepancy between u and u_n , since the change of normal distribution unfavorable to profits, only provisionally tolerated by capitalists in the given historical circumstances, confirms the conflicting nature of capitalism.

- 3) The causality of the adjustment mechanism is reversed: in case of discrepancies, it is the normal rate of capacity utilization that tends towards the actual one. The proposition seems quite *ad-hoc*¹⁸ and has been criticized in detail by Skott (2012), who points out the implausibility of firms which, in case of a deviation of u from u_n , do not adjust their accumulation rate, even against their own interests of profitability, because, after having studied Harrod, they are aware that this would generate externalities in the economy as a whole, engendering a spiral of instability. Instead, they responsibly decide to adequate the desired rate to the actual, reducing the basin of attraction of the unstable dynamics.

Given the dissatisfaction with both the Cambridge equation (inconsistency with Classical income distribution) and the Neo-Kaleckian models (*ad-hoc* abolition of the concept of normal degree of capacity utilization), let us turn to the Sraffian-Supermultiplier model proposed by Serrano (1995).

¹⁸ Skott defines it “an instability-based argument for adaptation” (Skott, 2012, p. 121).

The Sraffian-Supermultiplier model

The main purpose of the Sraffian-Supermultiplier model, originally presented in Serrano (1995), is to determine output according to the principle of effective demand, through an integration of the traditional Keynesian multiplier and an investment function based on the accelerator principle, in its flexible version. Coherently with the Classical and Sraffian tradition, income distribution is exogenously determined by social and historical factors, affecting the bargaining power of the opposite classes, and by customs and social norms about the fairness of wages. The main equilibrium results of the model can be easily summarized: if the rate of growth of autonomous demand¹⁹ is sufficiently persistent, all the relevant variables (aggregate demand, capital accumulation and output) evolve according to this rate of growth, capacity is normally utilized and entrepreneurs adjust their investment share in order to maintain this desired level of utilization.²⁰ Growth, differently from most of the Post-Keynesian and Neo-Kaleckian models, is not investment-driven but it is shaped by the independent evolution of demand components like exports, public spending and credit-financed consumption.

The essays presented below will claim that the Supermultiplier model

19 This is defined as the sum of those demand components that are independent from actual or expected output and that do not add to the private productive capacity of the economy.

20 The Supermultiplier model is not endorsed by all Sraffian scholars. In particular, Trezzini (1995, 1998) has criticized the model on the basis that “assuming long-run normal utilisation would therefore mean denying the independence of investment from capacity savings” (Trezzini, 1995, p. 37) and that “the prevalence of normal utilisation depends on the compatibility between the expected trend of aggregate demand and productive capacity, (this compatibility being realized only) when aggregate demand actually grows at a warranted rate, and when such a trend is perfectly foreseen by the firms” (Trezzini, 1998, p. 57). For a detailed discussion and a reply to these and other arguments, see Freitas and Serrano (2013) and Cesaratto (2015). Conversely, the Supermultiplier has drawn attention from some Neo-Kaleckian authors. See for example Lavoie (2013) and Allain (2014).

can provide an alternative, consistent solution to the theoretical problems left open by Harrod's model and unsatisfactorily dealt with by the Cambridge equation and Neo-Kaleckian literature. In particular, the Supermultiplier model fulfills some requisites proper of a satisfactory demand-led growth model:

- the extension to the long-run of the Keynesian Hypothesis, according to which *“in the long period, in which productive capacity changes ... it is an independently determined level of investment that generates the corresponding amount of savings”* (Garegnani, 1992, p. 47)
- an investment function based on the accelerator mechanism that do not engender Harrodian instability
- the absence of any necessary relation between the rate of growth and normal income distribution
- an equilibrium level for the degree of capacity utilization equal to the normal, desired one

As it will be shown, a key aspect of the Supermultiplier model, which allows to reconcile a long-run functioning of the principle of effective demand with an equilibrium degree of capacity utilization equal to the normal one and exogenous income distribution²¹ is that, differently from the Cambridge growth

21 As recalled, in Harrod there is a unique warranted rate, given by $g_w = s/v$. On the other hand, the flexibility of this rate is provided, in the Cambridge equation $g^k = s_\pi r$, by a change in income distribution while, in the Neo-Kaleckian model, by the variability of $u - g^k = \alpha + \beta(u^{eq} - u_n)$ - with u^{eq} free to range, in principle, from 0 to full-utilization. As shown in the first essay, the flexibility of the Supermultiplier 'warranted rate' - $g^z = (s - Z/Y)/v$ - is given by the endogenous variability of the average propensity to save. Notably, it is the introduction of Z that allows to distinguish between the given marginal propensity to save (s) and the average one ($S/Y = s - Z/Y$). As shown below, it is the change in the structure of demand due to the operation of the Supermultiplier that drives the adjustment of $s - Z/Y$. For completeness, it has to be reminded that, in Solow's model, the adjustment regards the technical coefficient v , through the Neoclassical substitution mechanism. As recalled, however, the latter is

model, there is no assumption of a productive capacity continuously utilized at its normal level. Discrepancies between the actual and the normal degree of capacity utilization are allowed in the out-of-equilibrium dynamics and the investment's reactions to these discrepancies, as it will be made clear in the thesis, drive the convergence of the economy towards a normal utilization of the productive capacity. In the Supermultiplier model, the higher savings required by an increase in the rate of accumulation are generated by an enlarged output. This is brought about by a rise in the degree of utilization of the existing stock of capital in the short-run and, in the long-run equilibrium of the model, after capacity has adjusted to demand, by a normal utilization of the larger productive capacity. In both cases normal distribution is not affected and the Keynesian Hypothesis is preserved

The Supermultiplier model is endowed with the necessary flexibility to be considered a satisfactory interpretative tool for real world phenomena. In the first essay of the thesis - 'Autonomous consumption, household debt and growth: a Supermultiplier-based analysis' - I will apply the model to the investigation of the macroeconomic consequences of debt-financed household consumption. Capitalist economies, particularly the United States, have displayed in the last decades a strong process of income polarization, whose twin aspect has been the increase of indebtedness of ample segments of the population. Pushed by the relative worsening of their income situation, by welfare retrenchments and also by status concerns and the desire to emulate media-advertised lifestyles, an increasing number of households have been borrowing heavily to finance their consumptions. By means of a consumption function that slightly modifies that introduced in Serrano (1995), I will try to

destituted of analytical content, after the results of the Capital theory controversy (see Petri, 2004).

delve into consequences and implications of this process. In order to highlight the advantages of the Supermultiplier model in this respect, a theoretical comparison with the problematic Neo-Kaleckian treatment of private debt will be provided. Finally, some conditions for the stability of the outstanding debt/debtors' income ratio will be sketched, which aim to discuss the sustainability and the financial fragility repercussions of consumer debt-led growth.

The second essay – 'Autonomous demand and the Marglin-Bhaduri model: a critical note' - discusses a generalization of the Neo-Kaleckian model and by far one of the cornerstones of Post-Keynesian theory: the Marglin and Bhaduri model of growth and distribution (Marglin and Bhaduri, 1990; Bhaduri and Marglin, 1990). It will be argued that the much praised elasticity of the model, meant as its ability to describe various economic regimes (e.g. the notorious wage and profit-led regimes), is to some extent artificial and depends on an implausible investment function. By means of a simple graphical analysis, it will be proved that, once the autonomous components of demand such as exports and government expenditure are explicitly considered, the model produces paradoxical results. In particular, the famous taxonomy - according to which demand regimes can be distinguished between stagnationist and exhilarationist while growth regimes can be wage-led or profit-led - no longer holds, questioning the consistency of the taxonomy under examination.

The third essay - 'An empirical investigation into the autonomous demand-growth nexus' - presents an empirical test of some major implications of the Supermultiplier model. After constructing time-series of autonomous demand and of the supermultiplier for the United States and for a sample of European countries (France, Germany, Italy and Spain), some econometric tests

will be performed, to assess the solidity of three theoretical propositions of the model: the rate of growth of autonomous demand tends to shape the pattern of evolution of output; a change in autonomous demand tends to be followed by a change in output in the same direction; a higher rate of growth of autonomous demand causes an increase in the investment share. As it will be shown, the results are quite comforting and seem to confirm the model's predictions, leaving the door open to further investigations.

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Autonomous consumption, household debt and growth: a Supermultiplier-based analysis

Abstract

In this essay, it will be argued that it is possible to give a plausible and stylized account of some relevant economic facts that have affected basically all the main Western countries in the last 30 years. In particular, the focus will be on the coexistence of a generalized increase in inequality in the distribution of income and the stagnation of real incomes for almost the totality of workers and wage earners in the lowest deciles from one side and the increasing trend of the consumption/GDP ratio from the other. This allowed mainstream commentators to depict the period started in the 80s as the Great Moderation Era and it is an apparent puzzle for Keynesian theory, a puzzle that it is easily solved if appropriate attention is given to the issue of the ongoing substitution of household debt for wages in financing consumption for ample segments of the population.

For this purpose, a simple theoretical framework will be provided to assess the macroeconomic implications of the diffusion of household debt. The analysis of debt-financed consumption is conducted through an extended Supermultiplier model (Serrano, 1995, 1996) with endogenous credit money, which allows highlighting the role of the autonomous components of demand, and in particular of autonomous consumption, as the main drivers of growth. A comparison with alternative heterodox formulations on the same topic is sketched, where it is argued that, unlike the Neo-Kaleckian models, in the presented model output growth adjusts to debt financed consumption, coherently with a demand-led growth framework. Having treated investment as fully induced, it follows that also the rate of capital accumulation adjusts to the rate of growth, which is itself determined by the path of autonomous demand.

A discussion of the stability of the debt/debtors' income ratio is provided. It will be proved to be affected, among other things, by the differential of growth between autonomous consumption (and debt) and the other autonomous components of demand.

Keywords: Household debt, Income distribution, Autonomous consumption, Supermultiplier

*As in a poker game where the chips were concentrated
in fewer and fewer hands, the other fellows could stay
in the game only by borrowing. When their credit ran out,
the game stopped.*

(Marriner S. Eccles, former chairman of
the Federal Reserve Bank, 1951, about
the Great Depression)

Introduction

The last decades have witnessed dramatic institutional and socio-economic transformations, which have been labeled as the “Neoliberal cycle”.¹ Its most evident aspect has probably been the generalized increase in inequality in the distribution of income and the stagnation of real incomes for almost the totality of workers and wage earners in the lowest deciles of population, across the vast majority of countries of the Western world.

Nonetheless, the relative fall in the purchasing power of households has not been accompanied, up to the onset of the Great Recession, by any decrease in their spending that, on the contrary, kept growing steadily², allowing mainstream commentators to depict the period started in the 80s as the Great Moderation Era. These phenomena prompted a growing interest in the macroeconomic effects and implications of private sector debt, which acted as a substitute for wages to fuel the consumption bonanza of the last thirty years (see Palley, 2002; Barba and Pivetti, 2009; Atkinson, Piketty and Saez, 2011 for a detailed discussion).

Indeed many authors of different persuasions (Cynamon and Fazzari, 2008, 2010, 2013; Barba and Pivetti, 2009; Palley, 2009; Kumhof and Ranci ere,

1 See Harvey (2007) and Vercelli (2015).

2 See Onaran, Stockhammer and Grafl (2011).

2010; Rajan, 2010; Hein, 2012a; Dejuán, 2013a; Stockhammer, 2015) have argued that debt-financed household consumption has been one of the main engines of growth in the last decades. I consider this suggestion extremely plausible and I will try to assess the ability of some existing heterodox growth models³ to include debt-driven autonomous consumption among the determinants of aggregate demand and growth, an inclusion that might also be useful to assess the sustainability of such a growth process and eventually contribute to explain the recent crisis. I will contrast these models with an alternative one, based on the Sraffian-Supermultiplier approach, as it has been introduced by Serrano (1995, 1996), and I will try to suggest that the latter can provide a more adequate interpretative tool.

The essay proceeds as follows: section 1 provides a short and essential sketch of some relevant economic facts that involved, during the last 30 years, almost all the Western countries, especially with respect to the trends in income distribution and debt accumulation. Section 2 briefly surveys a selection of Neo-Kaleckian works on household debt and growth. A discussion of some critical aspects of the models presented is provided and it is claimed that their main weakness concerns their problematic treatment of demand components other than induced consumption and investment. Section 3 introduces and clarifies the alternative Supermultiplier approach to growth, with its focus on the role of the autonomous components of demand. A summary of some controversies among heterodox economists, concerning the role of autonomous demand, is attempted. Section 4 argues in favor of an extension of the aggregate consumption function, with the purpose of allowing an integration of the issues

3 I will limit my attention to models which share broadly the Keynesian Hypothesis (Garegnani, 1992), according to which, in the long period, it is an independently determined level of aggregate demand that generates the corresponding output.

related with income distribution, conspicuous consumption and debt-financed consumption. This function is introduced into a Supermultiplier framework, to analyze some economic developments of the last three decades. A simplified version of the model is then discussed in growth terms. Some interesting results on the stability of the debt/debtors' income and on the adjustment of the rate of accumulation to the rate of credit-financed consumption are presented here. The last section summarizes the aforementioned results and concludes.

1. A brief historical perspective on income distribution and household debt during the Neoliberal Era

It is almost impossible to restrain a multidimensional and complex political and socio-economic process as Neoliberalism into a single and straightforward definition. For the same reason, the over 30 years in which this has proved to be the perhaps most influential and pervasive ideology are not explainable as the simple application of a fixed bunch of given political and economic prescriptions, even if we limit our attention to the Western world. Nonetheless, from the theoretical point of view and following Palma (2009) in his attempt to reconcile the Marxian and the Foucauldian interpretations of this issue, we can look at it as a "technology of power" that has been able to generate a spontaneous consensus, necessary for the acceptance of any institutional arrangement in a democratic system, towards the adoption of such measures as the deregulation of the financial and of the labor markets, the dismantle of the welfare state, the downsize of the State and of its tasks, the reduction of the progressive nature of taxation, the strategic relevance accorded to the military industrial sector and all the other options that configure the counter-offensive

of capital that followed the decades of the Keynesian consensus. We can look at the policy's priority change occurred between the end of the 70s and the beginning of the 1980s in the US and in the UK, with the shift from full employment to the fighting of inflation (Barba and Pivetti, 2012) as the starting point of the process, whose main features will be sketched below.

Some stylized facts

a. Income inequality

The path-breaking works of Piketty and Saez⁴ on extended time series of pre-tax incomes describe very clearly the alternate cycles in personal income distribution US passed through.

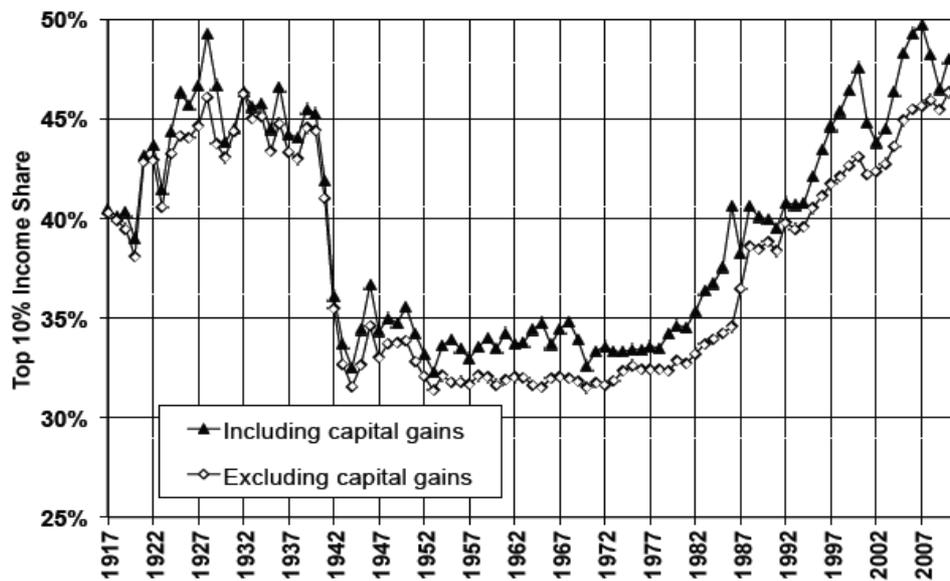


Figure 1: The top decile income share in the US, 1917-2011

source: Saez (2013)

4 See for example Piketty and Saez (2003, 2006) and Atkinson, Piketty and Saez (2006).

After the Great Depression the share of income accruing to the top decile fell sharply and remained basically stable for more or less the 30 years of the post-World War II Golden Age, showing on the contrary a constant upward swing from the last years of the 70s, up to the restoration of the pre-1929 share at the end of the first decade of the XXI century. Kapeller and Schütz (2012b) find analogous results, demonstrating the divergence in the real income rates of growth for families, decomposed by quintiles, in the US.

This strong redistribution from the lowest deciles to the top has been accompanied by a general reduction of the wage share⁵ all over the Western world, as it is possible to deduce for example from Figure 2, showing the last 60 years divergence in the trends in wage and productivity growth for the US⁶, with the resulting violation of the so-called *golden rule* for sustainable growth (Setterfield, 2010, p. 6).⁷

5 See also Kapeller and Schütz (2012a).

6 The same qualitative results, for many European countries, can also be found in Hein (2012a, 2013).

7 According to Setterfield (2010, see in particular the appendix), “the equation real wage growth = labour productivity growth is a good approximation for the condition necessary to maintain steady long run growth with full employment, or even simply a constant rate of unemployment” (ibid., p. 6).

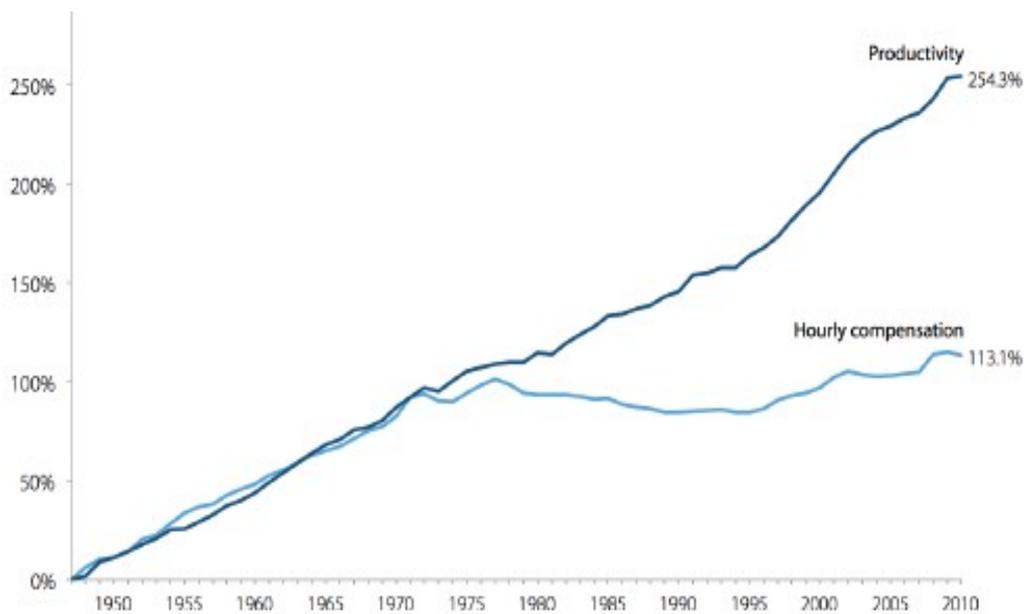


Figure 2: Productivity and hourly compensation of production and non-supervisory workers in the US, 1948-2011

source: Mishel (2012)

b. The debt explosion and the housing bubble

As pointed out in Setterfield (2010) and Onaran, Stockhammer and Grafl (2011), the joint consideration of two different tendencies in the US⁸ - on the one side the clear increase in income inequality, on the other side the trend of the consumption/GDP ratio - seems to pose a puzzle for Keynesian theory. Indeed in the last 30 years we have observed for the American economy a consumption boom, as it is shown in Figure 3, which seems to be counter-intuitive with

⁸ The majority of the empirical data reviewed here refers to the United States, given their paradigmatic, general relevance for the development of capitalist economies and the enormous amount of data and studies available. Of course, there are many institutional peculiarities, in some cases quite relevant, which are not just extendable to the European countries. Nevertheless, the qualitative conclusions should not be affected by such discrepancies.

respect to the standard assumption⁹ that the propensity to consume out of wages is higher than the propensity to consume out of profits.¹⁰

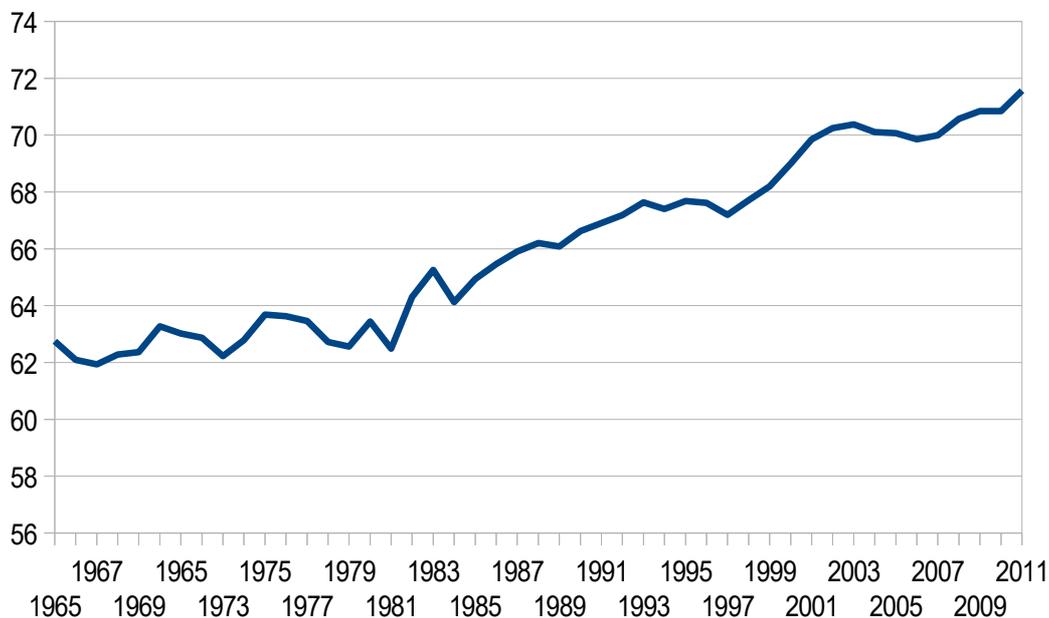


Figure 3: Consumption/GDP in the US, 1965-2011

source: World DataBank

The answer to this apparent puzzle lies in the fact that, in the light of the mentioned aspects about income distribution and of the additional evidence that neither exports nor investment¹¹ have performed in such a way to be identifiable as the drivers of the quite good macroeconomic performance of US

9 See Kaldor (1955-56) for a detailed discussion.

10 Another way to look at the same phenomenon is contained in Palma (2009), where the author notices that almost the same rate of growth of personal consumption expenditures (3.5%) for two different historical periods (1950-1980 and 1980-2006) was paired with very different rates of growth of the aggregate income of the bottom 90% of the US population (respectively 3.5% and 1.8%).

11 Investment experienced a surge only at the peak of the information technology boom, see Setterfield (2010), however not sufficient to be the driver of the American growth for the period considered here.

in the last three decades (Setterfield, 2010), the US and more in general the Western capitalist economies have been able to activate such “*margins of compensation*” (Palley, 2002) that allowed them to more than compensate the aggregate demand-generating problems related with the worsening of income distribution.

The first of these margins, namely “*a high rate of demand growth financed by unprecedented household borrowing*” (Cynamon, Fazzari and Setterfield, 2013, p. 2), is easily recognizable looking at the steady increase experienced by the household debt as a share of disposable income for US in the last 50 years, up to the sudden stop and downturn begun in the aftermath of the first symptoms of the Great Recession.¹²

¹² The same general trend for the household debt/GDP ratio is confirmed by the findings in Christen and Morgan (2005), Papadimitriou, Shaikh, Dos Santos and Zezza (2005) and Cynamon and Fazzari (2013).

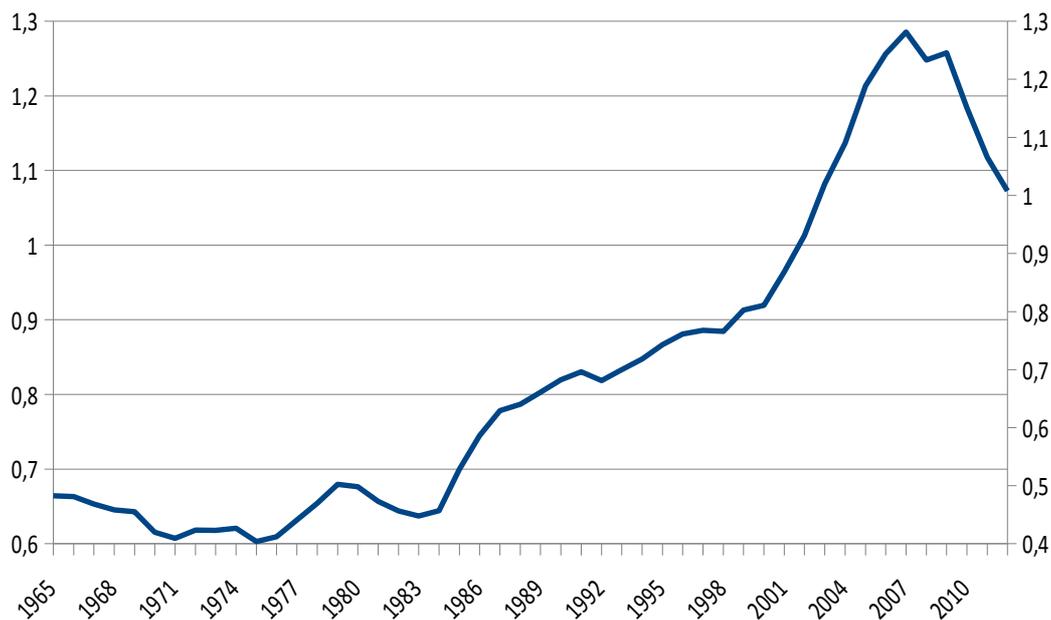


Figure 4: Household debt as a ratio to yearly disposable income in the US, 1965-2011

source: Flow of Funds Accounts of the United States, Bureau of Economic Analysis

Moreover, the fact that the subjects recurring to debt to finance their consumption were in most of the cases the same that were experiencing the worsening in their income share is confirmed by Figure 5 and by the finding of Christen and Morgan (2005, p. 148) of a “*strong positive effect of income inequality on household debt relative to disposable income*”. In a more neoclassical vein, Iacoviello (2008) supports this view, finding in his empirical work on the US in the 1963-2003 period that income inequality has been the main determinant of the debt explosion. Curiously enough, in the theoretical model behind the test, borrowers repay their debt with probability one and there is no possibility of default, rendering for this reason the model unfit to assess the macroeconomic consequences of the process ongoing in those years.

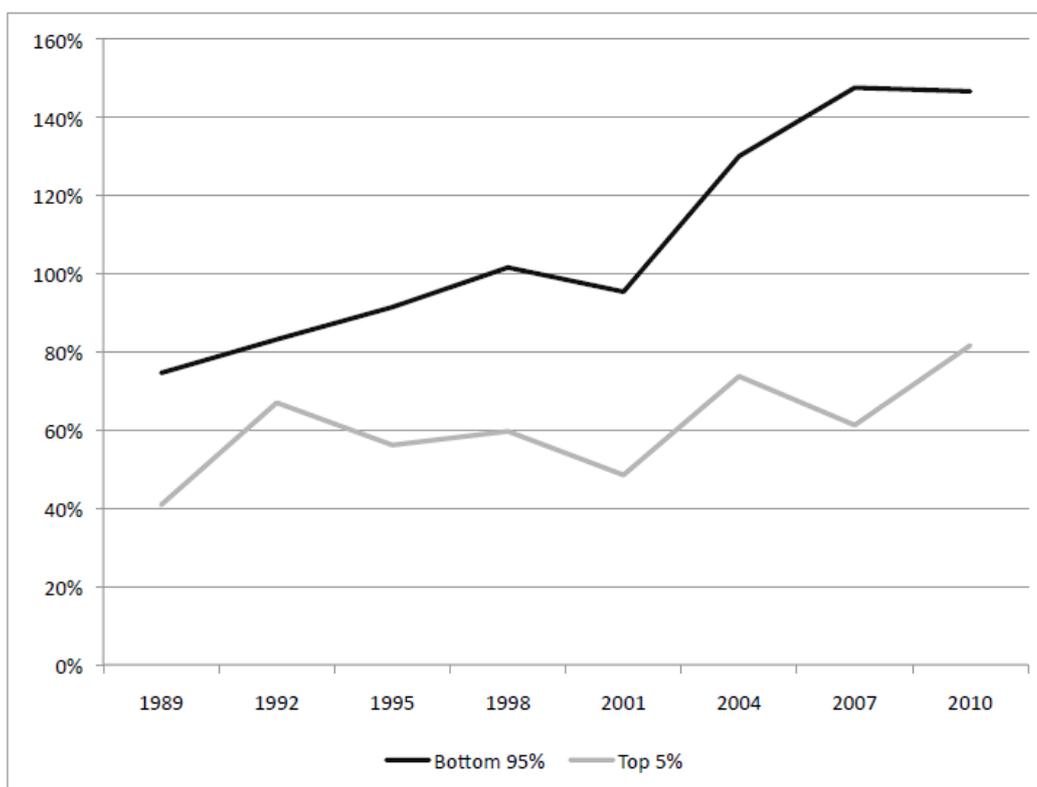


Figure 5: Debt-income ratios across income groups in the US

source: Cynamon and Fazzari (2013)

The stock prices boom represented another important stimulus for households to consume over their concrete possibilities, on the basis of the expectation of further appreciations of the value of their assets. The other leading actor of the story, and especially for the US, has been the housing market bubble. As argued by Kotz (2008) through the analysis of the ratio between Housing Price Index and the Homeowner's Equivalent Rent, with this second term being a standard indicator of the value of owning a house, the US passed through, starting from the beginning of the XXI century, a period of housing prices' increase mainly explained by speculative purchases based on

the (up to a certain point) reasonable expectation of further increases in these prices.¹³

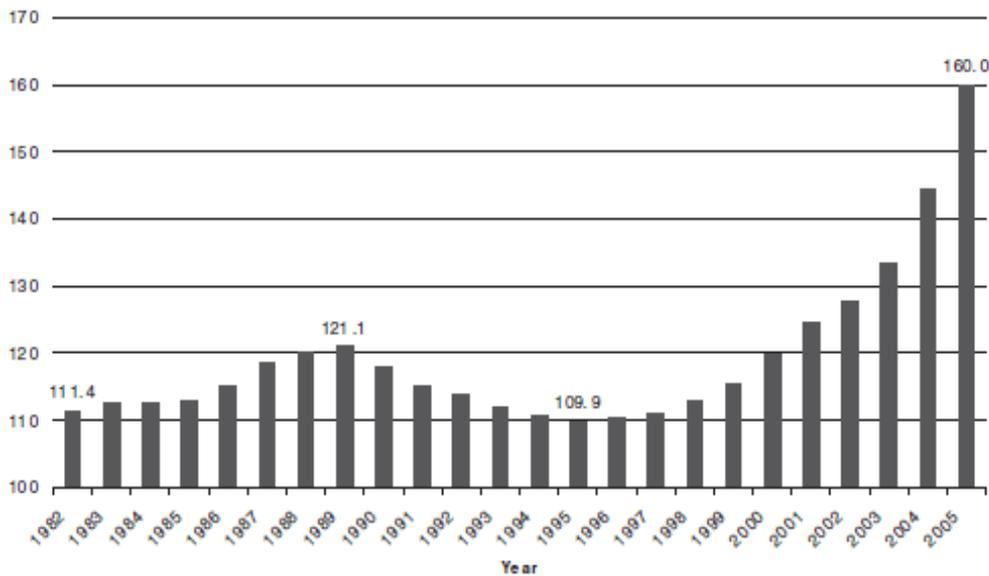


Figure 6: The housing price index (HPI)/Homeowner's equivalent rent (OER) ratio

source: Kotz (2008)

Thanks to peculiar institutional features of the US credit market¹⁴, for some years it has been possible for homeowners to extract equity, through renegotiations of the terms of existing mortgages, from the increasing value of their houses, used as a sort of ATM, and to use these amounts to finance not

13 Kotz (2008) argues interestingly about a natural tendency of the Neoliberal social structures to generate such bubbles. According to the author, income polarization tends to endow the richest fractions of the population with growing financial resources that need to be invested (put in other words, it generates enormous amounts of "managed money", see Wray, 2011). At the same time, this phenomenon strongly limits the potential final demand, with the result of surplus funds that are used to finance speculations in assets that become the natural candidates to be the subjects of bubbles.

14 See Barba and Pivetti (2009, in particular pp. 114-116) for a discussion of the role of home equity loans and HELOC (Home Equity Lines of Credit) in financing household consumption in the US.

only durable consumptions but current expenses too. As pointed out by Christen and Morgan (2005), being home equity withdrawals¹⁵ and mortgage refinancing classified as mortgage debt, this latter has been used as a *de facto* substitute for consumer credit and credit cards. This result is confirmed also by Barba and Pivetti (2009), who show the sharp increase in the mortgage equity withdrawal/disposable income ratio. The authors also identify the 1986 Tax Reform Act - which eliminated the deductibility from income tax of several interest payments, but maintaining it on mortgages interests - and more in general the credit promotion policies developed by the US government from the 80s as major generating causes of this phenomenon.

What finance¹⁶ has been able to operate is a disconnection of "*final demand from distribution through massive process of substitution of loans for wages and wealth effects*" (Barba and Pivetti, 2012, p. 127). Unfortunately, this process could not go on indefinitely. The chain of events¹⁷ (see Vercelli, 2011) begun with the first symptoms of a housing crisis in the US (2006) and the spike in the prices of oil, raw materials and food (2007-2008), which was followed by the FED decision to raise the discount rate in order to restrain inflation, was just the detonator that demonstrated how problematic was the process that had been going on since three decades. Adjustable rate mortgages became hardly repayable by many households, especially those whose creditworthiness

15 This term refers to the mentioned activity through which a household "increase its borrowing based on an increase in the market value of their house" (The CORE Project, 2015, p. 38). See also Barba and Pivetti (2009, p. 116).

16 As Sardonì (2015, p. 154) puts it, in his survey of strengths and weaknesses of Marx's analysis in explaining contemporary crises, "thanks to the expansion and innovation of the financial sector, the economy could, for a relatively long period of time, avoid the negative effects on aggregate demand of the worsening of wealth and income distribution".

17 For an alternative, strictly neoclassic, narrative of the events, see for example Justiniano, Primiceri and Tambalotti (2013), where the fall in the house prices is seen as a consequence of changes in the households preferences concerning housing.

standards were classified as sub-prime. The collapse of real estate prices¹⁸ that followed meant that home equity withdrawal was no longer available to replace wages as a source of purchasing power. As it is easy understandable, all the process was strongly self-reinforcing, it caused the sudden fall in the value of all the derivatives containing mortgages and led banks and financial institutions to write down or write off from their balance sheets securities for the value of billions of dollars and to drastically cut down the flow of credit conceded to households and firms, with the further tragic consequences on aggregate demand.¹⁹ The rest of the story is very well known.

In the remaining of the essay a simple model will be sketched, with the purpose of building a stylized interpretative framework able to deal with the historical developments described above.

2. Household debt in the heterodox literature

In the last decades, there has been a growing interest in the macroeconomic effects and implications of private sector debt, due to the institutional and social transformations of the last thirty years shortly depicted above. In particular, a branch of non-neoclassical literature of Keynesian-Kaleckian-Steindlian

18 See for example Justiniano, Primiceri and Tambalotti (2013, p. 4) for a picture of the trend in house prices in the 1970-2013 period.

19 The phenomena shortly described are part of a broader historical and institutional process, fundamental to understand properly the outcomes we are actually observing: namely what has been identified in the Minskyan literature as the transition of the global financial system toward a "money manager capitalism", defined in terms of an "economic system characterized by highly leveraged funds seeking maximum total returns in an environment that systematically underprices risk" (Wray, 2011a, p. 7) and that has elsewhere been called and defined as "financialisation", meaning with this term the "increasing role of financial motives, financial markets, financial actors and financial institutions in the operation of the domestic and international economies" to use Epstein's (2005, p. 3) words. These factors co-generated and amplified all the events described. See also Orhangazi (2008), Onaran, Stockhammer and Grafl (2011) and Hein (2011, 2012a, 2013).

inspiration has attempted an integration of household debt into demand-led models of growth and of the business cycle, with the purpose of assessing, from an analytical point of view, the feasibility and the sustainability of the processes of substitution of loans for wages in financing consumption and of debt accumulation, which took place in the pre-crisis period. Indeed, *prima facie*, access to credit guarantees debtors a purchasing power that would not be otherwise available given their disposable income. On the other hand, it implies the piling up of a stock of debt that potentially increases the financial fragility of the economy. Moreover, debt has to be served and repaid and this represents a drag on future growth, unless additional loans are granted on a degree capable of sustaining aggregate demand. Besides, the process is completely dependent on the banking system's credit supply and naturally prone to financial fragility.

The Neo-Kaleckian approach to household debt provides useful insights but also presents some unconvincing features. To discuss these aspects, it is useful to build a simplified version of a Neo-Kaleckian²⁰ growth model with household debt, based on Dutt (2006) and Palley (2010). These authors begin their analysis with similar consumption functions, which can be represented as:

$$C^w = c_w(1-\Pi)Y + B - rD \quad (1)$$

$$C^\pi = c_\pi(\Pi Y + rD) \quad (2)$$

Y is current output, Π is the profit share and r is the interest rate on debt. Equation (1) shows that workers/debtors consume a fraction of their income share plus B , the entire amount borrowed in the period minus the service of the debt accumulated. At the same time, according to (2), capitalists/creditors consume a lower²¹ fraction of their disposable income, given by their income

20 With this term, I refer to the theoretical framework for growth and distribution models originally developed by authors like Rowthorn (1981) and Amadeo (1986).

21 As done in most of the literature, it is assumed that capitalists have a lower marginal propensity to consume than workers.

share plus the interest payments on the stock of debt.²²

It is possible to add an accumulation function like the one discussed in the introductory chapter:²³

$$I/K = g = \alpha + \beta(u - u_n) \quad (3)$$

In this equation, α can be interpreted as the investors' assessed trend growth of sales; u and u_n are, respectively, the actual and the normal degree of capacity utilization, where the former is defined as $u = Y/Y^n$, with Y^n equal to normal output (the output obtainable utilizing the existing stock of capital at the normal level).

Savings are equal to $S = Y - C^w - C^\pi$. Hence it is possible to impose the goods market equilibrium condition $I/K = S/K$. As Palley notices (Palley, 2010, p. 296, eq. (13)), the steady-state equilibrium requires the further condition:

$$B/D = I/K \quad (4)$$

according to which the stock of debt grows at the rate of capital accumulation.

Let us now define $s = 1 - c_w(1 - \Pi) - c_\pi\Pi$ as the aggregate marginal propensity to save and $v = K/Y^n$ as the capital/normal output technical coefficient.²⁴ The equilibrium degree of capacity utilization, obtained imposing $I/K = S/K$ and solving for u , is equal to:

$$u^{eq} = \frac{\alpha - \beta u_n + \frac{B - (1 - c_\pi)rD}{K}}{\frac{s}{v} - \beta} \quad (5a)$$

The imposition of $B/D = I/K$ guarantees that $[B - (1 - c_\pi)rD]$ and K grow at

²² Debt repayment is neglected in the discussed works.

²³ The authors of the papers mentioned utilize slightly different accumulation functions, but the present argument is not affected. For the sake of comparability and consistency with the previous analysis, I utilize a standard Neo-Kaleckian accumulation function.

²⁴ As usual in non-neoclassical aggregate growth literature since Harrod, the dependence of the capital-output ratio on income distribution and on the composition of output is neglected.

the same rate and that u^{eq} does not change continuously. In order to see this, it is possible to rearrange equation (5a), after having defined $d = D/K$ as the ratio of the stock of debt over capital. Having substituted B/K for gd ²⁵ and reminding that $g = \alpha + \beta(u - u_n)$, we can solve for u and express the equilibrium degree of capacity utilization as:

$$u^{eq} = \frac{(\alpha - \beta u_n)(1+d) - (1-c_\pi)rd}{\frac{s}{v} - \beta(1+d)} \quad (5b)$$

where the numerator and the denominator of d grow, by assumption, at the same rate, so that d is constant.

Condition (4) is crucial to characterize the position represented alternatively by (5a) and (5b) as a persistent equilibrium. Indeed, only if $B/D = I/K$ holds, u^{eq} does not change period after period. This is due to the fact that the pace of total consumption (induced plus credit-financed) is determined by the rate of accumulation - equal to $g^{eq} = \alpha + \beta u^{eq}$ - which implies that the rate of growth of aggregate demand coincides with the latter. As a consequence, numerator (Y) and denominator (Y^n)²⁶ of the degree of capacity utilization grow in step.

Nonetheless, if loans to workers (B) are financed through endogenous credit money and not by capitalists' deposits/savings, their course is determined by workers' demand for credit, in principle independent and autonomous from the pace of capital. If this is the case, no theoretical justification is left for condition (4), nor is any plausible mechanism available to bring the accumulation of debt in line with the accumulation of capital.²⁷

25 The equality $B/K = gd$ derives from equation (4).

26 From the definition of $v = K/Y^n$ and under the assumption of the constancy of this ratio, we can see that $g^{Y^n} = g^K$.

27 In Dutt (2006) an explicit mechanism is provided: a functional expression for the desired

Apparently, the necessity of such a strict assumption lies in the very basic structure of the Neo-Kaleckian growth model. According to this model the economy is investment driven, so that the rate of accumulation determines the rate of growth of aggregate demand and consequently of output. This view is consistent either (i) with the neglect of the components of demand other than induced consumption and investment, as for example exports, public spending and autonomous consumption or (ii) with the *ad hoc* assumption that these components grow at the same rate of capital accumulation. The second hypothesis is precisely the one made in the model discussed here, in which debt-financed consumption turns up to be induced by g and, in conclusion, is not autonomous at all.

If, on the other hand, the Neo-Kaleckian model were integrated with demand components whose rate of growth is independent from the rate of accumulation, the latter would converge towards the former and the evolution of output would be driven by the exogenously determined rate of growth of autonomous demand, as proved by Lavoie (2013) and Allain (2014).²⁸

Equally problematic appears the treatment presented in Hein (2012b). After having introduced consumption functions identical to (1) and (2), the author makes explicit that “*credit going to workers ... depends on rentiers’ income and savings*” (ibid., p. 20), as indicated by:

$$B = bS^\pi = b(1-c_\pi)(\Pi Y + rD) \quad (6)$$

where b represents the fraction of capitalists’ savings (S^π) devoted to finance workers’ debt, while $(1-b)$ is the amount of savings that contributes, together

level of borrowing B_d is provided, given by $B_d = b[(1 - \Pi)Y - rD]$, with the assumption that $B_d = B$. In this way, the demand for loans grows in line with income and output and condition (4) is satisfied.

28 See Appendix B for a summary of the arguments presented in Lavoie (2013) and for a presentation of his Neo-Kaleckian model with autonomous demand.

with workers' savings, to equalize investment in equilibrium. This seems a quite restrictive assumption, which is at odds with the Post-Keynesian view that sees endogenous money creation as the source of credit, an approach I shall endorse in the next section. Moreover, the claim that the parameter b can be seen as affected also by "*the willingness of the firm sector to invest in capital stock*" (ibid., p. 20) can also be questioned. The author's argument runs as follows: one of the effects of financialisation is the increased "*shareholder dominance and shareholder value orientation of management*" within the firm sector (ibid., p. 20). This implies, Hein maintains, a reduction of long-run real investment in capital stock, replaced by short-run financial investments, a process that can be represented by an increase in the parameter b . It has to be noticed that this reasoning seems to reverse the standard Keynesian causality between investment and savings. As a matter of fact, an increase in b – and specularly a reduction in $(1-b)$, the fraction of savings which equalize investment - would simply imply that, in order to generate the amount of savings caused by the independently determined level of investment, a larger increase in income would be required, that is to say a higher multiplier effect would be exerted.

From equation (6), a long-run equilibrium condition (ibid., p. 27) analogous to equation (4) follows, whose logic is to be found in the fact that the pace of the debt-financed fraction of consumption is determined by the pace of capitalists' savings, which are in turn induced by the output growth.

Summing up, in the Neo-Kaleckian approach the pattern of the demand for loans is shaped by the accumulation rate. Therefore, the former component does not play any independent function in determining aggregate demand growth.

Nevertheless, it appears reasonable to maintain that the debt-led growth

process that sowed the seeds for the Great Recession can be better explained looking at the autonomous pattern of credit-financed consumption, its effects on the rate of growth of output and its macroeconomic consequences. In this section, it has been argued that the Neo-Kaleckian model does not provide a fully satisfactory tool to perform this task.²⁹ For this reason, an alternative model will be proposed in the next sections.

3. The Supermultiplier

a. The model

In this section, it will be introduced a baseline version of the Supermultiplier³⁰ model, proposed by Serrano (1995, 1996) and further discussed and applied in Cesaratto, Serrano and Stirati (2003) and others.³¹ It is worth reminding that in this approach income distribution is treated, according to the Sraffian tradition, as exogenously determined by social and historical factors, concerning the bargaining power of the opposite classes, customs and social norms about the fairness of remunerations and other social habits (see for example Stirati, 1994 and Levrero, 2013). Accordingly, the model does not presume any automatic relation between the rate of accumulation and distribution or, in Garegnani's words (Garegnani, 1992, p. 64), *"a long-period rise in investment needs not alter distribution in order to generate the corresponding savings"*, due to the fact that any necessary amount of savings will be generated endogenously by the rise in the

29 As it is well known, the Neo-Kaleckian growth model has also been criticized because one of its main outcomes is an equilibrium level for the capacity utilization different from the normal one. Moreover, in this framework any attempt to restore a normal degree of utilization generates Harroddian instability. For detailed discussions on these topics, see Hein, Lavoie and van Treeck (2012), Cesaratto (2015) and the introductory chapter of this thesis.

30 The basic idea is the integration of the traditional Keynesian multiplier with a flexible accelerator.

31 See for example Dejuán (2005) and Smith (2012).

level of output entailed by an increase in effective demand.³² In the short-run the adjustment of savings to investment will take place through a degree of capacity utilization above the normal one. On the other hand, in the long period the process of accumulation is called to adapt the capacity to demand, with the objective of producing at the desired level of capital utilization. Furthermore, associated with the given technology and real wage, a Sraffian system of normal, competitive³³ relative prices is assumed to hold.³⁴

We can start with the output equation:

$$Y_t = c(1-\tau)Y_t + I_t + G_t + (X_t - mY_t) + C^a \quad (7)$$

where Y_t , the current level of output, is equal to aggregate demand. The latter is the sum of induced consumption, investment, public expenditure (G), net exports ($X - mY$) and autonomous consumption (C^a). As usual in the literature, c is the marginal propensity to consume, τ is the tax rate and m the marginal propensity to import. We may collect all the autonomous expenditures and indicate them as $Z = G + X + C^a$, equal to the sum of all the components that are independent from the actual or expected level of income and that do not add to the private productive capacity of the economy.

Gross investment³⁵ is treated as completely induced³⁶ and is described by the function:

32 An equal, specular, line of reasoning applies in the case of a downward adjustment of savings.

33 In talking of competition, I presume the existence of sufficient capital mobility, such as to guarantee the uniformity of the rates of profit on alternative investments, as in the Classical tradition. See Ciccone (2011).

34 Since object of this work is the study of aggregate quantities, I shall neglect the effect of growth on relative prices, without any intention to deny the possible multiple mutual influences.

35 I am assuming that all the capital is fixed, neglecting for simplicity circulating capital.

36 This represents a relevant difference with respect to other heterodox contributions as for example Marglin and Bhaduri (1990) and all the related literature. See the second essay of this thesis for a critical discussion of the Marglin-Bhaduri's investment function.

$$I_t = v(\delta + g_t^e)Y_t \quad (8)$$

where δ is the rate of capital depreciation, v is the exogenously given capital/normal output technical relation and g_t^e represents the entrepreneurs' estimate of the trend growth rate of demand. What equation (8) tells us, following again Garegnani's line of reasoning (Garegnani, 1992), is that entrepreneurs will base their investment decisions about new plants on the basis of the output they expect to produce to meet expected effective demand.³⁷ Obviously, they aim at running the newly installed capital at its normal, target level of utilization, on average over the lifetime of the equipment, as required by the maximization of their expected profits and enforced by the pressure of competition. Moreover, they are gradually substituting their deteriorated capital, desiring a normal utilization also on its replacements.

Defining the aggregate marginal propensity to save as $s = 1 - c(1 - \tau) + m$, we can express the long period, demand-determined output as:

$$Y_t = \frac{Z_t}{s - v(\delta + g_t^e)} \quad (9) \quad 38$$

While the level of output given by the autonomous components Z multiplied by the so-called Supermultiplier does not necessarily imply a normal utilization of productive capacity, at the same time a continuous tendency towards the latter is in operation. Given the highly specialized nature of the already installed capital, hardly adaptable and modifiable, the process of convergence towards a normal utilization will be gradual and brought about on

37 This view is tersely presented by Serrano (2004, p. 14): "In the long run the size of lucrative investment opportunities depends on the level and rate of growth of effective demand – the demand of those who can pay normal prices (that price that allows firms to obtain the normal rate of profits, which defines the minimum accepted standard of profitability). If effective demand is expanding, whether normal profits margins happen to be 'high' or 'low', competition and the search for maximum profits impel the firms collectively to expand productive investment".

38 To have an economically meaningful result, the condition $s - v(\delta + g_t^e) > 0$ must hold.

the new capital. The expected rate of profit on these newly installed plants, which are supposed to be run at their target level, given the expected expansion of demand, is the “normal” rate of profit, the one that matters for the determination of the long period “normal” prices. Meanwhile, a continuous process of expectations' revision is also at work, given by:

$$\dot{g}^e = \gamma(g - g^e) \quad (10)$$

where g represents the actual rate of growth and γ is an adjustment coefficient. While $\gamma = 1$ would identify a rigid accelerator, in the Supermultiplier model, due to the flexible nature of the accelerator adopted, we assume that $0 < \gamma < 1$. This implies that firms do not pursue a continuous full adjustment of capacity to demand, given that not all the demand fluctuations are considered permanent, whereas the capital installed has to be able to meet demand efficiently for several periods of time. Equation (10) implies also a process of adaptation of the rate of growth of capacity (see equation (13) below) to the rate of growth of demand and output.

Translating the problem in dynamic terms, from equation (9) we may derive the rate of growth of output, equal to:

$$g_t = g_t^Z + \frac{v \dot{g}_t^e}{s - v(\delta + g_t^e)} \quad (11)$$

where g_t^Z is the exogenous rate of growth of the autonomous components of demand.

We know that:

$$\dot{u} = u(g - g^K) \quad (12)$$

where the rate of growth of capital is given by:³⁹

$$g_t^K = u_t(\delta + g_t^e) - \delta \quad (13)$$

³⁹ The equation follows from $g^K = \frac{I}{K} - \delta$, being $v = \frac{K}{Y^n}$ and $u = \frac{Y}{Y^n}$.

Equation (13) makes clear that the same expected rate of demand growth can give rise to different accumulation behaviors, depending on the actual degree of capacity utilization: firms are prompted to accumulate faster when u is higher and vice versa.

Imposing $\dot{g}^e = \dot{u} = 0$ in the system given by (10) - the expectations' revision process - and (12), we have that $g_t^e = g_t^K = g_t = g_t^Z$ and $u_t = 1 = u_n$. This means that, if a given rate of growth of autonomous demand is sufficiently persistent, the output and the productive capacity of the economy slowly tend to the position represented by the so-called “*fully adjusted*” Supermultiplier (Cesaratto, Serrano and Stirati, 2003). We also conclude that, along the equilibrium path, all the relevant variables evolve according to the rate of growth of the autonomous components, expectations are realized and capacity is normally utilized. If the conditions for the dynamic stability of the system are satisfied⁴⁰ the position given by equation (14) represents the center of gravitation of the economy:

$$Y_t^n = \frac{Z_t}{s - v(\delta + g_t^Z)} \quad (14)$$

However, it is important to clarify that - as it emerges from equations (10)–(13) - outside the equilibrium path and in the process of convergence to it, the rate of growth of autonomous demand, the rate of growth of output and the rate of accumulation are different from each other and capacity is not utilized at its desired level.

We can observe that such a model, with its proper consideration of the autonomous components of aggregate demand, is able to escape from the very

40 The formal condition for the dynamic stability of the system is given by $g^Z < s/v - \gamma - \delta$, as it is proved in the Appendix A, which can be rearranged as a marginal propensity to spend lower than 1.

well known problem of the “Harrodian Instability”. To recall it briefly, according to Harrod (1939), any permanent deviation of the growth rate from the Warranted rate, say an increase, would lead to an over-utilization of capacity that cannot be self-reabsorbed. This is because the increase in the investment - intended to accomplish the task of bringing u back to u_n through an increase in the productive capacity – also generates an increase of equal amount in demand and consequently in output, with no possibility for the actual degree of capacity utilization to come back to its target level. On the contrary, according to the Supermultiplier approach, the presence of autonomous components of demand, growing at an exogenous rate and not reacting when investment varies, makes aggregate demand and product (the numerator of u) less reactive to an over-(under) utilization than the productive capacity (the denominator of u).⁴¹ The result is that the gradual process of

41 To analyze the problem in Harrodian terms, we could say that a key aspect of the present model is that, differently from the Harrod's one, marginal and average propensity to save do not coincide, with the latter being equal to $\frac{S}{Y} = s - \frac{Z}{Y} = s \frac{I}{I+Z}$, where s is the former. For this reason what we could define, from $I=S$ and $u = u_n$, as the Supermultiplier “warranted rate” is equal to $g^z = \frac{s - \frac{Z}{Y}}{v} - \delta$. We can imagine a permanent, unexpected increase in g^z ,

which causes a permanent increase in the equilibrium rate of growth of demand and output. Recalling that s , v and δ are exogenous, given parameters, the increase in g^z has to be accommodated by a decrease in the ratio Z/Y and by the corresponding increase in the share of investment in output. I have assumed that induced investment has the task to adjust capacity. Hence, as a reaction to the initial over-utilization, prompted by the unexpected rise in the rate of growth of autonomous demand, investment will speed up. As we can see from eq. (11), this implies that output will grow, for a certain span of time, at a rate higher than g^z . Once $u=1$ is reached, Y and Z will grow at the same rate, but until then Y has grown more than proportionally, due to the acceleration in investment. In spite of the fact that the rate of growth of autonomous demand is now higher, the share of these demand components in output is lower. At the same time, a new, higher “normal” investment share in output has prevailed. For this reason, we can conclude that the Supermultiplier “warranted rate” itself adjusts, with the adjustment going in the right direction. We are also able to see how the necessary amount of savings required to balance the growth in investment is endogenously determined through the modification of the ratio representing the average propensity to

revision of the expectations expressed by the equation (10)⁴², with the related adjustment in what we can call the marginal propensity to invest $v(\delta + g_t^e)$, allows a tendency to the alignment of the actual output growth rate, the expected one and the rate of growth of capacity. Of course, as pointed out by Dejuán (2013b, p. 16), “(the model) does not imply that capitalism is a stable system. (It) simply suggests that economic instability usually stems from the volatility of the autonomous trend, not (necessarily) from the accelerator mechanism”. In other words, equation (14) does not describe any secular growth of capital. This equation has the more limited ambition to help to explain specific periods, episodes or modes of accumulations (and the seeds of forthcoming crisis within them) as, for instance, the consumer debt-led growth of the Great Moderation Era that preceded the Great Recession or the German export-led mercantilist model and the European financial unbalances that it created (see Cesaratto and Stirati, 2010). Although also the Neo-Kaleckian model aims at explaining this variety of growth experiences (and crises), the above mentioned difficulties of these models to accommodate the autonomous components of aggregate demand suggest the Supermultiplier model as a most promising approach in this respect.

As clearly pointed out by Freitas and Serrano (2013) and as it is possible to deduce from the above argument, the model described does not imply at all “a continuous fully adjusted growth path” (Freitas and Serrano, 2013, p. 22). Indeed, in the Supermultiplier model the relevant rates of growth (rate of

save. Furthermore, it is clear that this ratio is not univocally determined by individual or institutional saving behaviors but it reflects also the economy's demand structure.

42 A discrepancy between g_t^e and g_t is also a discrepancy between the rate of growth of capacity and the output growth rate. To understand why, it can be useful to consider a fully adjusted position with normal capacity utilization: if for any reason a divergence occurs between the actual and the expected rate of growth, this will appear as a divergence between the level of output and the level of normal output. The process identified by equation (10) allows the required adjustment in the capacity, carried on through variations in investment.

capital accumulation, rates of growth of output and of Z) are equal to each other only in the equilibrium path, while they are allowed to diverge during the disequilibrium adjustments. It is exactly the possibility for the rate of accumulation to be higher or lower than the rate of growth of demand and output that allows adjusting productive capacity and restoring normal utilization in case of an exogenous shock.

A further clarification is in order: while a relevant majority of Post-Keynesian and Neo-Kaleckian demand-led growth models tend, in general, to be investment-driven⁴³, in this case the long-run trend growth rate of the economy is determined by the growth path of autonomous demand. Nonetheless, a higher rate of growth of the economy still goes along with a higher investment share.⁴⁴ The difference with the other heterodox models mentioned above lies in the causality, which in the present model goes from the rate of growth of the autonomous components to the rate of growth of demand and output, with an aggregate investment function fully induced and appointed to keep pace with the evolution of aggregate demand.

b. Some controversies about the role of autonomous demand: Park, Shaikh and Fazzari et al.

There is however, even among non-neoclassical authors, a certain degree of controversy regarding the role of the autonomous components of aggregate demand and their relation with output growth. In Park (2000), for example, a higher rate of growth of autonomous demand leads to an equilibrium path

43 See Lavoie (2006, chapter 5) for an exhaustive overview.

44 From the investment equation (8) and the equilibrium conditions, it comes out that $(I/Y)^{eq} = v(\delta + g^Z_t)$.

characterized by a lower rate of growth of output, due to the fact that, in the author's words, *"as the larger part of aggregate demand is used for non-capacity generating purpose, ceteris paribus, the lesser part thereof will be used for accumulating productive capacity"* (Park, 2000, pp. 9-10). It is however necessary to keep in mind that Park's reasoning implies the assumption of continuous normal capacity utilization. As Freitas and Serrano makes clear, a growth model with such assumption simply describes a *"growth path based on Say's law when one component of aggregate demand grows at a rate independent from the rate of growth of aggregate output and demand"* (Freitas and Serrano, 2013, p. 20). Hence, in this case normal capacity output determines actual output and normal capacity savings determine the rate of accumulation compatible with keeping utilization continuously normally utilized. No independent role for aggregate demand is left and more of Z causes less of I . Given that in Park's analysis capacity has to be utilized continuously at its target level, the rate of accumulation and the rate of output growth have to coincide all the time and if the former slows down, the latter adjusts consequently.

On the contrary, the Supermultiplier model is based on the principle of effective demand and there is no assumption of continuous normal utilization. Total demand is not bounded and an increase in g^Z has as a consequence an acceleration in the process of accumulation - in order to endow the economy with the new productive capacity required to produce normally the increased demand - towards a new equilibrium path characterized by a rate of growth equal to the higher rate of growth of autonomous demand.

An argument similar to Park's is advocated by Shaikh (2009), which develops an expressly Harrodian model in which autonomous components are introduced. An equation for the warranted rate is presented (ibid., p. 469), given

by:

$$g^Y = [s - (G_t + X_t)/Y_t] u_n/v \quad (15)$$

where s is the marginal propensity to save, u_n the normal degree of capacity utilization, v the normal capital-output ratio, G is public spending and X represents export. Equation (15) is analogous, in principle, to the Supermultiplier warranted rate (see footnote 41), interpreting the sum of G and X as equivalent to Z . The author claims that an increase in the rate of growth of the sum of G and X will be expansionary or contractionary depending on the impact on the $(G+X)/Y$ ratio, that is to say that the equilibrium rate of growth of output will increase only if the Z/Y ratio decreases. However Shaikh considers this case to be unlikely and maintains that usually the increase in Z will result in a reduction in output growth, thus qualifying government spending and exports as “*too much of a good thing*” (ibid., p. 469). This does not happen in the Supermultiplier model presented above, due to the presence of margins of unutilized productive capacity. An increase in g^Z is initially accommodated by above-normal capacity utilization. The latter increases investment, whose

contribution to output growth is represented by the term $\frac{v g_t^e}{s - v(\delta + g_t^e)}$ in equation (11), and for this reason Y temporarily grows more than proportionally to Z (see equation 11). The Z/Y ratio will thus have decreased, while the investment share has increased.

Shaikh's analysis presents another aspect open to criticism: the author claims that it is possible to prove the stability of a traditional Harrodian warranted path, without any need to resort to the autonomous part of demand. It is simply required that firms “*try to adjust capacity growth relative to output growth whenever they are facing capacity discrepancies*” (ibid., p. 465). An

accumulation function is introduced, very similar to a Neo-Kaleckian one (see equation (3) in the introductory chapter of this work):

$$g^K = g^e + \beta(u - u_n) \quad (16)$$

Investment tries to catch up with expected growth demand (g^e) and in addition attempts to establish normal capacity utilization, with a positive reaction coefficient β .

Due to the assumption of firms' perfect foresight (ibid., eq. (10), p. 465), it is possible to develop a "*Hicks-Harrod dynamic adjustment mechanism*" with zero-mean error ε , given by:

$$g^K = g^Y + \beta(u - u_n) + \varepsilon \quad (17)$$

which is easily proved to provide a stable adjustment process. As it is readily understandable, the only reason why the above mechanism is able to circumvent the Harroddian instability generated by the Shaikh's resembling Neo-Kaleckian investment function is that by construction $g^e = g^Y$, that is to say that by construction the author's proposal is designed to remove the economic process from which instability arises. On the contrary, the Supermultiplier model is based on a much less restrictive assumption of adaptive expectations, paired with an explicit consideration of the stabilizing influence of autonomous demand.

In a recent contribution on similar topics, Fazzari et al. (2013) obtain a theoretical result that is in contrast with both Shaikh's and Supermultiplier's conclusions. According to the authors, not only Harroddian instability is a natural characteristic of any economy, but it is also the driving force of the growth process. In their view, the economy is permanently on a unstable growth path. Indeed, if the rate of growth is higher than the Harroddian warranted rate, "*demand grows because it follows an explosive upward path that is*

ultimately limited by resource constraints” (ibid., p. 1). Once this ceiling is reached, the direction of the unstable path switches from expansion to contraction and the economy collapses until it reaches the floor represented by autonomous demand, the part of demand that is independent from the cycle. At this point, the direction of the unstable dynamics is reversed again and the economy experiences positive, explosive growth. To present the argument, the authors use the output equation:

$$Y_t = C_t + I_t + Z_t \quad (18)$$

where Y , C , I and Z are defined as above, and an adaptive expectations mechanism (ibid., p. 9) given by:

$$\begin{aligned} g_t > g_t^e &\rightarrow g_{t+1}^e > g_t^e \\ g_t = g_t^e &\rightarrow g_{t+1}^e = g_t^e \\ g_t < g_t^e &\rightarrow g_{t+1}^e < g_t^e \end{aligned} \quad (19)$$

Equations (18) and (19) are close to equations (7) and (10) of the Supermultiplier model, but the conclusions are divergent. The reason can be found in the different investment functions utilized. According to Fazzari et al., accumulation proceeds according to the equation $I_t = K_{t+1}^* - (1-\delta)K_t$, with the desired capital stock at time $t+1$ equal to $K_{t+1}^* = v(1+g_t^e)Y_t$. The resulting investment function:

$$I_t = v(1+g_t^e)Y_t - (1-\delta)K_t \quad (20)$$

and equation (8) are similar but reflect a different assumption about the underlying capacity adjustments. As argued above, equation (8) describes firms that pursue normal capacity utilization on average over the lifetime of the machinery and that, in their assessment of the trend growth rate of demand, are aware that some demand fluctuations are only temporary. On the contrary, according to (20) firms try to reach normal utilization and to adjust the whole

stock of capital in every period and consider any demand change as permanent.⁴⁵ Due to this, the model presented by Fazzari et al. generates instability, in spite of its explicit consideration of autonomous demand.

After this brief survey, I will argue in the next section that, with the integration of a slightly more complex consumption function, the Supermultiplier approach is able to grasp the basic stylized institutional and economic developments depicted in section 1 and to provide useful insights.

4. Including household debt into the picture

a. Consumerism, income distribution and debt-financed conspicuous consumption

In reference to the standard formulations about aggregate consumption proper of Keynesian theory, according to which consumption is generally passive with respect to the level of income, it is possible to move forward and try to include the very well known insights on conspicuous consumption derived from the classic work of Veblen (1975) [1899], which over a century ago underlined the individuals' concerns about the social visibility of consumption. According to this approach, households' preferences are socially mediated, evolve endogenously with respect to the environment and present a strong propensity for status considerations. Consumption has no longer the simple task of satisfying individual's material necessities; it also becomes an indicator of the social position and the adherence to both a certain social structure and a common ground of values and habits. Moreover, in a context of extremely

⁴⁵ To have a taste of the different magnitudes involved, it is possible to rearrange equation (20), obtaining $I = v[1 + g^e - (1-\delta)/u]Y$, and compare it to (8), noticing that $I(\text{eq.20}) > I(\text{eq.8})$ as long as $\delta < 1$.

fragmentary information and heavy uncertainty, households will tend to be driven in their behavior by social norms, that are mainly determined by the habits and the behavior of the reference groups, in general constituted by wealthier and successful households.⁴⁶

Compared to the time of Veblen's book, society has significantly changed, but nonetheless the relevance of the original Veblen's intuition is nowadays further amplified. While the reference group traditionally relevant for the creation of the aspiration levels was identified in the neighborhood (that is a concept of physical proximity), today the external influences of consumption patterns have enormously widened through mass media. The post-WWII period, at least in the US, witnessed the first relevant traces of opulent consumption mediated by the new media, as pointed out e.g. by Galbraith [1958] (1968). The years of the Neoliberal Era have been characterized by a radical speeding up in this process: advertising and television in general have contributed to the creation of a fascinating and continuously evolving ideal standard of life, based on compulsive consumerism and on the continuous generation of new needs that the individuals perceive to be imperatively satisfied if they want to be integrated and accepted in their social structure of reference. No surprise that the average consumer has been caught in a consumers' arms race⁴⁷ (Frank, 1997) and no surprise that the evolution of consumption aspirations has taken place quite independently of the evolution of the per capita income of the vast majority of population. Paradoxically, as we

⁴⁶ See also Gualerzi (2012).

⁴⁷ In a situation in which the consumer strives to reach the consumption levels of the richer households, a sort of "expenditure cascade" is observable, where the desire of emulation leads households to consume more, with the result that this increased spending level generates endogenously new needs, that tend to become the new driving norm, endowed with its own increased desired level of consumption, self-reinforcing the process in a potentially endless race.

have seen above, two different and opposite tendencies overlapped in the last 30 years: the continuous increase in the aspired consumption standards has been paired with the steady deterioration of income distribution and with the related stagnation in the purchasing power for the lowest deciles of population, which are also the more reactive to the “keeping up with the Joneses” effect.

Garegnani and Trezzini (2010) discuss an important implication of the socio-economic phenomena described above, which will not be addressed in the present work: according to the authors, it is possible to translate the persistence and the social relevance of consumption’s habits into a consumption function asymmetric with respect to the phase of the cycle. In particular, these authors emphasize the relative inelasticity of consumption when income decreases. Indeed households strive to maintain their acquired expenditure standards, even when their income stagnates or declines. In Garegnani and Trezzini's analysis⁴⁸, this is brought about by means of a reduction in the fraction of income saved by households, leading to a “*progressive upward shift in the propensity to consume*” (Garegnani and Trezzini, p. 120). As Cynamon and Fazzari (2013) report, this is exactly what happened in the US for households outside the top decile, as a consequence of the trends in income distribution of the last decades. Unfortunately, the purchasing power flow coming from the reduction of the saving rate proved to be insufficient. Coherently with Garegnani and Trezzini's argument, if the income decline is prolonged over time, the consumption over disposable income ratio approaches a ceiling that

48 It has to be clarified that the main aim of the paper discussed is slightly different from the present one. Indeed Garegnani and Trezzini argue that, once the assumption that aggregate demand fluctuates regularly is added, the asymmetry of consumption provides an endogenous source of output growth. This happens because, over the cycle, the average multiplier increases, prompted by the increase in the share of income that is consumed. Garegnani and Trezzini's work presents a further difference: investment is treated by these authors as mainly autonomous.

can be overcome only borrowing.

It is exactly at this point of the story that household debt comes into play, called upon to fill the gap between the desired, target level of consumption and the level that is possible to finance out of wages and earned incomes.

The last decades have also shown a twin aspect of this phenomenon: the attitude of households towards indebtedness has significantly changed, in response to the necessity to sustain levels of consumption that the mere flow of income proceeding from the working activity cannot simply afford. In a self-reinforcing process, the desire to keep up with the richer reference points in the extended neighborhood has made debt more socially acceptable, allowing the catching up households to overcome their actual income possibilities and contributing to the previously mentioned consumers' arms race. In the context of a worsening of the income distribution, this has also required that the financial system provided access to consumer credit to a wider range of working class families.

A decisive contribution to the spread of the social acceptance of debt has also taken place through continuous financial innovations⁴⁹, also with the proliferation of less and less transparent financial instruments. This financial evolution "democratized" the access to credit, opened the doors of credit to

49 In this respect, it is interesting to notice how this "supply side" factor is seen in some mainstream analysis as the main, or perhaps only, cause of the credit cycle observed especially in the last 10 years. For instance, according to Mian and Sufi (2009), the post-2002 loosening and the following tightening, begun in 2007, of credit standards explain the spike and the subsequent fall, after the first symptoms of the Great Recession, in the household debt/GDP ratio. Another supply side explanation (e.g. Shiller, 2007 or Mian and Sufi, 2011) stresses as the principal cause of the cycle the boom in house prices, which allowed the appreciation of the collateral backing the households' debt and the consequent increase in their possibility of borrowing. The two approaches briefly mentioned shed some light on very relevant issues, nonetheless they fail to recognize why households decided and needed to borrow more and more to sustain their living standards in the light of the worsening of their relative income.

segments of population traditionally excluded and allowed the consumption boom begun in the 70s and showed by Figure 3.

It is worth noticing that, over the last 30 years, households have not got into debt just to afford frivolous consumption and to emulate lifestyles beyond their economic means. Indeed, the period under consideration has also been characterized by the spread of political prescriptions such as a minimal State, welfare retrenchments and privatizations, with the result that an increasing number of households has been forced to pay for services, strictly necessary for everyday life, that until then had traditionally been provided by the State and financed out of general taxation. In this respect, at least two paradigmatic cases can be mentioned, especially regarding the US, for their crucial contribution to the accumulation of an enormous stock of household debt: student loans taken out in order to pay increasing University fees (Guttmann and Plihon, 2010; Wray, 2011c) and financial liabilities to medical providers⁵⁰ (Doty et al., 2008; Himmelstein et al., 2009; Jacoby and Holman, 2010).

Obviously, the whole story has its dark side. Financial fragility enormously increased, with its contagious potential stemming from households to the bank system balance sheets and vice versa, as the events started at the end of 2007 proved and as it has been argued in the first section.

It appears possible to grasp the intuitions that can be found in the seminal book of Veblen (1975) [1899] and in more contemporary works like for example Cynamon and Fazzari (2008, 2010), with their further in-depth analysis on households debt, through a modified consumption function.⁵¹ Taking

50 According to Himmelstein et al. (2009, p. 3), medical bill problems contributed to 57.1% of all bankruptcies in 2007.

51 The consumption function that will be introduced reflects a particular institutional structure and of course cannot be an approximation able to fit all the most relevant economies in the world. If we turn for example our attention to a big international actor like China, we find a situation with a credit market sensibly less developed and also with completely different

inspiration for this purpose on the recent contribution of Kim, Setterfield and Mei (2014), we can start with the following equation:

$$C_t = C_t^w + C_t^\pi \quad (21)$$

where C_t^w is workers' consumption. C_t^π represents the consumption of capitalists, financed out of their profits plus the interest payments they receive as owners of the banks. We can define this latter term as:

$$C_t^\pi = c_\pi[(1-\tau)\Pi Y_t + rD_t] \quad (22)$$

and workers' consumption as:

$$C_t^w = c_w[(1-\tau)(1-\Pi)Y_t - (r + \phi)D_t] + \beta[C^n - c_w((1-\tau)(1-\Pi)Y_t - (r + \phi)D_t)] \quad (23)$$

where again Π is the profit share, c_π and c_w are respectively the propensities to consume out of their disposable income of capitalists and workers, with the usual assumption that $c_\pi < c_w$. D_t is the stock of household debt at time t , on which the bank loans rate r and the percentage of repayment ϕ are paid. C^n is the consumption norm that contains the information about the socially mediated preferences of workers and the standard of consumption they aim to reach, based on their cultural reference groups. I assume that $r = (1+\mu)i$, with the rate on loans set by the banks as a mark-up on the interest rate i , set by the monetary authorities. For simplicity, it is assumed that only workers borrow in order to finance part of their consumption⁵², consistently with the findings of

consumption and debt social norms. For this reason, the process of worsening of income distribution in that country has not been paired as in the US with an increase in the household debt and with the apparently counter-intuitive increase in the consumption/income ratio. On the contrary, households reacted and react contracting their expenses and increasing their precautionary savings, with the consequent decrease in the C/Y ratio.

52 Moreover, it is assumed that workers can borrow and save at the same time, following also with this respect Kim, Setterfield and Mei (2014), since savings and debt are not perfect substitute for them. A further assumption is that, in case workers deposit their savings in a bank account, the interest they earn on this is negligible with respect to the interest they have to pay on the amounts borrowed, coherently with the imperfect nature of competition in the real world credit markets.

van Treeck and Sturm (2012) based on the Survey of Consumer Finances. According to them, the process of indebtedness of the last 30 years has mainly interested the households outside the top decile.

According to equation (23), households consume a fraction c_w of their disposable income, given by the difference between their share in income and the payments due on the outstanding debt. In addition, they partially fulfill the difference between their target level of consumption and the level they can finance with their own resources⁵³ recurring to debt. The parameter β can be seen as an indicator of their impatience to “keep up with the Joneses” and of their ability and possibility of getting into debt.

Coherently with an endogenous credit money approach, as presented for example in Lavoie (2003), Fontana and Setterfield (2009) or Arestis and González (2013a), I assume that the credit flow is endogenously determined by the demand for loans and it is provided by the banking system, without being constrained by the amount of deposits held by the same banks.⁵⁴ In other words, the banking system accommodates any request of funds by households, if perceives it as profitable and if predetermined parameters of creditworthiness are respected. In my simple macro model, I assume that banks will supply credit until the condition (24) holds:

$$(1-\tau)(1-\Pi)Y_t + \text{col}(HW_t) \geq (r + \phi)D_t + C^{\text{sb}} \quad (24)$$

where C^{sb} is a conventional, subsistence level of consumption. According to this condition, banks will concede all the credit required until the fraction of income accruing to workers plus an indicator of the value of the collateral (col),

⁵³ I am assuming that this difference is positive, given that the target level of consumption is influenced by the patterns of consumption of the ample “neighborhood” represented by the richest fractions of population, as argued above.

⁵⁴ This is one of the main difference with approaches such as Hein (2011, 2012b), Isaac and Kim (2013) and Kim, Setterfield and Mei (2014), who assume that the amount of credit available is determined by the amount of savings deposited in the banks by the capitalist class.

represented by their housing wealth (HW)⁵⁵, backing their borrowings, suffice to pay the interest on the outstanding debt and the agreed upon fraction of repayment plus a minimum level of consumption that households cannot forgo for a decent survival.⁵⁶ The rationale behind the introduction of housing wealth in the condition (24) is the attempt to give the intuition of a tendency at work, especially in the last decade, for the US market: credit has been conceded also to borrowers whose working incomes were barely sufficient to expect a repayment of the loans. Nonetheless, the expectation of continuous appreciations of the value of their collateral created an environment prone to continuous lending to these subjects. This process has been called “*financial accelerator*”, defined as “*the mechanism through which a rise in the value of the collateral leads to an increase in borrowing and spending by households and firms*” (The CORE Project, 2015, p. 37).

In case of violation of the condition, the banking system perceives its financial position as too risky and does not accommodate any other request of credit, expecting that potential further loans would not be repaid.⁵⁷

55 Coherently with Iacoviello's (2008) argument, also here “only real assets can be used as a form of collateral” (p. 936).

56 Obviously, this customary level of subsistence consumption is not merely defined in terms of physical necessities, but it is a socially determined measure that takes into account a minimum level of such expenses not renounceable and perceived as necessary in a modern, capitalist economy. For this reason, the actual consumption will range between a minimum, C^{sb} , and its desired level, C^n .

57 Obviously, this is just an over-simplification of the behavior of the banking system, whose analysis is basically neglected in the present work. The model formulation simply attempts to approximate the plausible reaction of banks in front of a “too high” level of debt and of an increased financial fragility of the system. Of course, in the real world things are much more complicated: banks for example will not cut down drastically the flow of credit to the whole of households. Notwithstanding, there are few doubts that what happened at the beginning of the Great Recession is that banks, in the face of the first massive defaults of their “sub-prime” debtors and the consequences on their balance sheets, reacted cutting down credit as a counteraction to a financial position they started to perceive as potentially explosive, amplifying in this way even more the consequences of the crisis. For a detailed description of the process that led to the credit crunch during the recent Great Recession, see Guttman

b. Autonomous consumption and its macroeconomic consequences

Having investigated in the previous paragraph the determinants of one of the components of autonomous demand, namely the fraction of household consumption that is not financed out of their working income, we can plug the above analysis into a Supermultiplier framework and try to assess its macroeconomic implications.

For the sake of simplicity, I consider the case of a closed economy. Utilizing the consumption functions introduced in the paragraph a, we have that the long period position for the output towards which the economy is gravitating is represented by:

$$Y_t = \frac{Q_t + \beta C^n - [(1-\beta)c_w - c_\pi]rD_t - (1-\beta)c_w\phi D_t}{1 - c_w(1-\beta)(1-\tau)(1-\Pi) - c_\pi(1-\tau)\Pi - v(\delta + g_t^e)} \quad 58 \quad (25)$$

with Q_t representing the autonomous components of demand others than credit-financed consumption and $C^a = \beta C^n - [(1-\beta)c_w - c_\pi]rD_t - (1-\beta)c_w\phi D_t$ equal to autonomous consumption.⁵⁹

I mentioned in section 1 the apparent paradox represented by the positive trend of the consumption share in the last three decades, seemingly counter-intuitive in the face of a persistent process of worsening in income distribution. According to traditional Keynesian wisdom, this should have

and Plihon (2010).

58 Here again, to obtain an economically meaningful result, the condition $1 - c_w(1-\beta)(1-\tau)(1-\Pi) - c_\pi(1-\tau)\Pi - v(\delta + g_t^e) > 0$ must hold.

59 The conditions for the local dynamic stability of the model require again the marginal propensity to spend to be less than one. Notwithstanding, there is a difference with respect to the analogous case without debt-financed consumption, where the condition would be $(1-\tau)[c_w(1-\Pi) + c_\pi\Pi] + v(\gamma + \delta + g^z) < 1$, while in the present case we have $(1-\tau)[c_w(1-\beta)(1-\Pi) + c_\pi\Pi] + v(\gamma + \delta + g^z) < 1$, with g^z representing the rate of growth of the whole of the autonomous components. We can conclude that, due to the smaller marginal propensity to consume, the model with debt is more dynamically stable.

given rise to a serious consumption-generating problem and a consequent almost immediate fall in the level of output. As we have seen, on the contrary, this has not manifested itself for more than 30 years and I can now try to propose an interpretation of what allowed the coexistence of these trends in the years of Great Moderation and why this came to an end.

First of all, from equation (25) we notice that workers' consumption is now less reactive to their income share with respect to the standard case without personal debt: $c_w(1-\beta)(1-\tau) < c_w(1-\tau)$. Secondly, it is also possible to see that the depressive effect of the increase in the denominator⁶⁰ of the expression (25) and the specular decrease in the Supermultiplier that is entailed by a process of shift of income from the wage share to the profit share⁶¹ can be off-set by a rapider increase in the autonomous components of demand, the numerator of (25), that by definition are independent from the actual or the expected level of income.

In particular, I focus my attention on autonomous consumption, given its particular prominence and its leading role in driving growth in the US and in many other Western countries in the recent past. For this reason, I argue that a continuous increase in the debt-fueled fraction of consumption can be able, at least for a certain span of time, to counteract a continuous increase in inequality and the related demand generating problem. Nonetheless, this process has its

60 I am assuming that $(1-\beta)c_w > c_\pi$.

61 In the model, I represent an increase in inequality just through a decrease in the wage share $1-\Pi$, referring only to functional distribution and this can be a good approximation of what happened generally in Continental Europe. On the contrary, in other cases as for example the US and UK, the income polarization was mainly characterized by inequality in the personal distribution. Notwithstanding, as pointed out by Stockhammer (2012), the common feature was the reduction in the share of non-managerial wage earners in national income and if we assimilate the wage of top-manager to profits, the model is able to give an acceptable approximation of the distributional transformations of the Neoliberal Era in the Anglo-Saxon countries as well.

own dark side. The reliance on the credit conceded by the banking system leads to a growth process that can go on indefinitely only if banks are willing to keep conceding loans indefinitely. The problem is that the behavior of banks is not driven by demand support concerns. Instead, we can reasonably assume that they continue to lend up to the point they perceive it as too risky and no more profitable or, to use the condition introduced above, until the inequality $(1-\tau)(1-\Pi)Y_t + \text{col}(HW_t) \geq (r + \phi)D_t + C^{\text{sb}}$ holds. If we rearrange it as

$$1 \geq \frac{(r+\phi)D_t}{(1-\tau)(1-\Pi)Y_t} + \frac{C^{\text{sb}}}{(1-\tau)(1-\Pi)Y_t} - \frac{\text{col}(HW_t)}{(1-\tau)(1-\Pi)Y_t} \text{ and look at the}$$

tendencies at work in the last three decades, we can understand very well why the process was necessarily destined to an abrupt end. Figure 4 and Figure 5 show the continuous increase in the household debt – income ratio, which is an increase in the first right term of the above condition. Moreover, according to the findings in van Treeck and Sturn (2012) about American families, in the last 20 years the income perceived by households as necessary to survive with dignity increased by more than 40%, while median real incomes increased by just the 20% in the same period and we can synthetically represent these two aspects as an increase in the second right term. Another feature of reality that can be represented is the bursting of the real estate bubble and the consequent reduction in households' housing wealth, as it happened in the US from 2006, with the related fall in the value of collateral backing loans. Evidently, tendencies of this kind cannot go on indefinitely without violating, sooner or later, the condition of creditworthiness required, according to the model prescriptions, by the banks to keep supplying loans.

An increase in the policy variable represented by the interest rate and its impact on the bank loans rate, in such a context, can only accelerate this

process, as the events observed in the US after the FED reaction to the first symptoms of the recent crisis have showed. The position of the borrowers becoming more and more unsustainable leads to an increasing number of agents not able to face the payments on their debt and banks change drastically their behavior. Obviously, in reality things are slightly more complex than in the scenario depicted by the model. As we know, the rate of interest charged on household debt is strictly related with the policy determined official interest rate but does not coincide with it. Indeed banks add a remuneration to cover their normal rate of profit plus a risk premium. In particular, this last term helps to explain why, in spite of the after-Recession drastic cuts on the official rates by the Central Banks, the debt burden on borrowers remained very high and problematic, given that the banking system reacted to the households increased financial fragility by requiring a higher risk insurance, a larger μ in the model (see on this Dejuán, 2013a). To use Arestis and González words (2013b, p. 3), *“The system collapses when the banking sector perceives a high level of households’ indebtedness that induces a tightening of credit standards and increases in interest rates since borrowers’ risks are higher”*. Moreover, the twin effect of the burst of the housing bubble is also the interruption of the direct channel of finance for households given by the above mentioned mortgage equity withdrawal, coming from the appreciation of the value of their houses.⁶²

In terms of the simple model presented, all this is translatable as the β parameter going to 0.

62 As pointed out by Hyman (2011, p. 4), “unpaid debt skyrocketed not because consumers began to borrow, but because they continued to borrow as they and their parents had done since World War II, but without the postwar period’s well-paying jobs [...] Though credit could be used to grapple with short-term unemployment and decreased income, in the long-term loans had still to be repaid [...] Buoyed by a long boom in housing prices, Americans used asset-growth to substitute for wage-growth, which worked fine as long as house prices continued to rise”.

The macroeconomic consequences of the contemporary manifestation of these events⁶³, as it happened at the beginning of the Great Recession, is that autonomous consumption is no longer available to interpret a leading role as driver of demand and output growth and the economy starts to gravitate towards a new, lower long period position, represented by:

$$Y_t = \frac{Q_t - (c_w - c_\pi) r D_t - c_w \phi D_t}{1 - c_w (1 - \tau)(1 - \Pi) - c_\pi (1 - \tau) \Pi - v(\delta + g_t^e)} \quad (26)$$

and characterized by a smaller numerator (the autonomous components of demand, without the debt-financed consumption) and a higher denominator, as a consequence of the ongoing process of increasing inequality, given by the rise in the profit share.⁶⁴

A caveat is necessary: the model has been presented for the case of a closed economy. Including the dynamics of international trade into the picture poses in fact further questions that have not been analyzed in the present work. “*Wage deflation policies*”, to use the words of Jean-Claude Juncker, could partially stimulate the international competitiveness of a country and its exports, one of the components of autonomous demand, and counteract, to some extent, the drag on growth embodied by a weak internal demand. This is the case, for example, of China or Germany, the unique European country, according to Eurostat and as reported by van Treeck and Storn (2012), where exports contribute to growth more than internal demand. Notwithstanding, even in this

63 At the onset of the Great Recession, also the stock of financial wealth hold by households dropped drastically in almost all the Western countries, with perhaps the only exception of Japan, as reported by De Bonis, Fano and Sbrana (2013). This aspect has been neglected in the present work but, if considered within the model, would generate macroeconomic consequences analogous to those entailed by the drop in credit-financed consumption and the fall in housing wealth.

64 The effect on denominator is partially counteracted by the increase in the marginal propensity to consume of workers. Nonetheless, this increase amplifies the depressive effects of a shift from wages to profits.

case the increase in income inequality has an enormous destabilizing potential, represented by the global imbalances inherent to the contemporary presence of countries with wide current account surpluses and countries with specular deficits.

c. The growth implications of the model

For an analysis of the growth effects of household debt accumulation, it can be useful to use a simplified version of the model presented above, with endogenous credit money supplied by the banking system, where this implies that “banks can lend without affecting the consumption of their owners” (Palley, 1994, p. 374, footnote 2).⁶⁵

In particular, I use the following consumption functions, similar to those presented in Dutt (2006), Palley (2010), and Hein (2012b) and already introduced in section 2, with two differences: workers consume a fraction of their disposable income, given by the wage share minus the payments on debt, plus the new borrowings⁶⁶, and debt repayment is considered. Equation (27) describes workers' consumption:

$$C_t^w = c_w[(1-\Pi)Y_t - (r + \phi)D_t] + B_t \quad (27)$$

65 Palley (1997) and Palley (2014) present a model of the business cycle with both loanable funds credit (called “direct finance”) and endogenous credit money (“indirect finance”), where it is pointed out that “Direct finance involves a transfer of existing money balances, while bank-provided indirect finance involves the creation of new money balances. For this reason, bank-provided indirect finance has a larger effect on aggregate demand and goods market” (Palley, 1997, p. 135). Given that the present work centers its attention on the role of the autonomous components of demand and for the sake of simplicity, only indirect finance is considered here.

66 On the contrary in the models presented in section 2 workers consume a fraction of their income share and then pay the interest on debt. The conclusions are in any case analogous in both scenarios.

r is equal to the interest rate, considered as given for the sake of simplicity, ϕ to the percentage of principal's repayment and D_t to the stock of debt at time t . B is equal to the new borrowings and represents the part of workers' consumption financed by endogenous credit money, in their attempt to pursue their desired consumption norm.

Capitalists' consumption is equal to:

$$C_t^\pi = c_\pi[\Pi Y_t + rD_t] \quad (28)$$

where capitalists, as owners of the banks, receive the interest payments on debt from workers.

The fact that capitalists' consumption is not curtailed by the act of lending renders equation (28) analogous to those presented in Palley (1994, p. 374, footnote 2) and Palley (1997) as proper of an endogenous credit economy. This allows us to treat B as positive autonomous consumption, "*the component of aggregate consumption that is not financed by the purchasing power introduced in the economy by capitalists' production decisions. The purchasing power used to finance autonomous consumption comes from ... the access to new credit finance*" (Freitas and Serrano, 2013, p. 3).

Neglecting for the moment the existence of autonomous components of demand other than autonomous, debt-financed, consumption and including a simple accelerator-based investment function ($I_t = hY_t$, with h equal to the marginal propensity to invest⁶⁷) we have that:

$$Y_t = c_w[(1-\Pi)Y_t - (r + \phi) D_t] + B_t + c_\pi[\Pi Y_t + rD_t] + hY_t \quad (29)$$

which leaves us with:

67 Analogously to the process described by equation (10) above, the marginal propensity to invest h adjusts according to $\dot{h} = h_t\gamma(u_t - u_n)$, until the equilibrium position characterized by $u = u_n = 1$, $g = g^Z$ and $h^{eq} = v(g^Z + \delta)$ is reached. From $I_t = h_t Y_t$ and $\dot{h} = h_t\gamma(u_t - u_n)$, we can see that the evolution of investment is described by $g_t^I = g_t^Y + \gamma(u_t - u_n)$.

$$Y_t = \frac{B_t - (c_w - c_\pi)rD_t - c_w \phi D_t}{1 - c_w(1 - \Pi) - c_\pi \Pi - h} \quad (30)$$

I collect the autonomous consumption terms as $C_t^a = B_t - (c_w - c_\pi)rD_t - c_w \phi D_t$.⁶⁸ As argued in section 3, we have that in equilibrium $g^Y = g^{C^a}$: given a sufficient amount of time, demand and output will tend to evolve at the rate of growth of the autonomous components of demand, in this case autonomous consumption.

It can be interesting to track the path of the debt/debtors' income ratio, as a measure of the financial solidity of the economy. As argued in paragraph b, this ratio is a fundamental indicator of workers' capacity to repay their debt and therefore it is one of the most important parameters on whose basis the banking system will decide whether keeping supplying credit or not.

It can be proved that the rate of growth of autonomous consumption - g^{C^a} - and the rate of growth of debt - g^D - tend to coincide. As a first step, I divide by D both sides of $C^a = B - (c_w - c_\pi)rD - c_w \phi D$. Given that $dD/dt = B - \phi D$, from which $B/D = g^D + \phi$ can be derived, I get $C^a/D = g^D - (c_w - c_\pi)r + (1 - c_w)\phi$. Taking the logarithm of this equation and deriving it with respect to time, we have that

$$\dot{g}^D = (g^{C^a} - g^D)[g^D - (c_w - c_\pi)r + (1 - c_w)\phi] \quad (31)$$

Assuming that $g^D > (c_w - c_\pi)r - (1 - c_w)\phi$ ⁶⁹, equation (31) tells us that the rate of growth of debt changes as long as it is different from g^{C^a} and converges to the latter, so that in equilibrium $g^{C^a} = g^D$, both equal to g^Y . This condition is analogous to the equation (4) presented above (equation 13 in

⁶⁸ The term $(c_w - c_\pi)rD_t + c_w \phi D_t$ can be seen as negative autonomous consumption.

⁶⁹ The condition imposed derives from the assumption that autonomous consumption is greater than 0: from $B - (c_w - c_\pi)rD - c_w \phi D > 0$, dividing by D and recalling that $B/D = g^D + \phi$, we obtain $g^D > (c_w - c_\pi)r - (1 - c_w)\phi$.

Palley, 2010, p. 296), but the direction of causality is reversed, going in the present case from the rate of growth of autonomous consumption to the rate of growth of output (and the rate of capital accumulation), while in Palley (2010) causality runs from the rate of capital accumulation to the rate of growth of credit-financed consumption.

Having assumed that in the simple economy represented by equation (30) only workers borrow to finance their consumption, it is possible to conclude that the ratio $d_t = D_t / (1-\Pi)Y_t$ is stable as long as the wage share is constant, given that in equilibrium the numerator and the denominator grow at the same rate. Any increase in the profit share, on the contrary, does not affect the rate of growth of output but decreases the disposable income of debtors and worsens the d ratio.

The inclusion into the model of the other autonomous components of demand, which I call Q , adds a new relevant dimension to the analysis of the stability of the debt/income ratio. With $Z_t = C_t^a + Q_t$, we have that:

$$g_t^Z = g_t^{C^a} \frac{C_t^a}{Z_t} + g_t^Q \frac{Z_t - C_t^a}{Z_t} \quad (32)$$

where the rate of growth of Z is a weighted average of the rates of growth of its components, with the weights represented by the components' share in Z .

With this in mind, it is easy to see that if debt-financed consumption grows more rapidly than the other terms of Z , we have that $g^D > g^Z = g^Y$ and, even with a constant wage share, the ratio of debt over debtors' income continuously increases. This is because, in this scenario, the accumulation of debt is faster than the growth of the whole autonomous part of demand, which determines the rate of growth of output.

It is possible to conclude that the sustainability of the private debt

position of an economy depends, among other things, on the rate of growth of public expenditures and exports. Indeed these two autonomous demand components contribute to the determination of the output growth rate together with credit-financed consumption. As it has been argued, the growth differential between C^a , whose evolution tends to shape the pattern of the stock of personal debt, and the other parts of autonomous demand is a main factor in explaining the path of the households' debt to income ratio.

Comparing my results with the former literature, we may note that:

a) differently from the models discussed in section 2, in the present work the path of autonomous demand, one of whose components is debt-financed consumption, determines output growth. Since investment is treated as fully induced, the rate of capital accumulation will tend to adjust to g^z . On the contrary, in the Neo-Kaleckian models discussed above the pattern of the demand for loans is shaped by the independently determined accumulation rate.

b) my treatment is different also from the analysis in Barba and Pivetti (2009), where the authors claim that *"in the case of indebted households the course of their incomes must be regarded as independent of the course of their debts"* (Barba and Pivetti, 2009, p. 127). According to Barba and Pivetti, due to the shifts in income distribution that have accompanied output growth in recent decades, the richest 10% of population tends to appropriate most of the income's increase generated by credit-financed consumption. Consequently, in their view, the denominator of the d ratio – $(1-\Pi)Y$ - has to be regarded as exogenous with respect of the course of its numerator D . On the other hand, in the case described in the present essay, I have argued that debt-financed consumption is one of the driving forces of economic growth, which directly affects the course of

aggregate income and consequently also of indebted workers' income.

Conclusions

To summarize, we can conclude that a prolonged worsening in income distribution has negative effects on the level of consumption, unless a counteracting positive level of autonomous consumption is at work (or, so long as it is possible, a continuous reduction in workers' propensity to save). In a genuine demand-led growth model, where investment is dependent on the expected rate of growth of demand and not on distributive variables, this has negative effects also on the level of the aggregate long-period output, given the autonomous components of demand. Moreover, if the process of income polarization is continued over time, it also affects the rate of growth of output, and not only its level. To offset this effect a continued increase in the rate of growth of the autonomous components of demand is required. As we have seen, serious problems arise if this is brought about through a sustained rise in debt-financed household consumption, which leads the economy to an increasing financial fragility that could not be sustainable indefinitely. I have argued that this is what happened at the onset of the Great Recession, as a consequence of the lengthy trends in income distribution and household debt accumulation that characterized the Neoliberal Era.

I have also argued that, in the very same years, an increasing effort has been devoted, mostly by heterodox economists, to develop an analytical framework capable of investigating the relationship between household debt and growth. In the paper, I maintained that the Neo-Kaleckian approach presents some unsatisfactory aspects. In particular, debt-financed consumption

does not play any autonomous role in explaining aggregate demand and output growth and appears ancillary and passive with respect to an independently determined accumulation rate.

If, on the contrary, a Supermultiplier model, integrated with an explicit consideration of household debt financed through endogenous credit money, is utilized, several results follow: in particular, the path of autonomous consumption is one of the factors that drives output growth and, as a consequence, the rate of accumulation. Investment is in fact treated as completely induced by output and it is done with the purpose of endowing the economy with the productive capacity necessary to meet the expected demand at the normal degree of capacity utilization. For this reason, in the simplified model presented, accumulation adjusts to the exogenously given rate of growth of autonomous demand.

Hence, differently from the Neo-Kaleckian models on the same topic, it is output growth that adjusts to debt financed consumption, coherently with a demand-led growth framework. Therefore, I argued that the Supermultiplier could provide a more fruitful interpretative tool in the attempt to investigate the debt-fuelled growth period that preceded the Great Recession.

In this respect, the other main result concerns the stability of the outstanding debt/debtors' income ratio, which has been proved to be affected, among other things, by the growth differential between autonomous consumption (and debt) and the other autonomous components of demand. This suggests that exports and public expenditures are main actors in determining the sustainability of the private debt position of an economy.

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Appendix A: The conditions for the local dynamic stability of the Supermultiplier model.

From eq. (A1), which expresses the demand-determined level of output as the product of autonomous demand and the supermultiplier:

$$Y_t = \frac{Z_t}{s - v(\delta + g^e)} \quad (\text{A1})$$

we can derive:

$$g = g^Z + \frac{v \dot{g}^e}{s - v(\delta + g^e)} \quad (\text{A2})$$

with g equal to the output rate of growth, g^Z to the rate of growth of the autonomous components of demand, g^e indicating the expected trend rate of growth of aggregate demand, s the aggregate marginal propensity to save and v the capital/normal output ratio.

We also have the following accumulation rate, as argued in section 3:

$$g^K = u(\delta + g^e) - \delta \quad (\text{A3})$$

I want to study the system given by:

$$\dot{g}^e = \gamma(g - g^e) \quad (\text{A4})$$

$$\dot{u} = u(g - g^K) \quad (\text{A5})$$

Plugging equation (A4) into (A2), we obtain the following expression for the rate of growth:

$$g = \frac{g^Z(s - v(\delta + g^e)) - v \gamma g^e}{s - v(\gamma + \delta + g^e)} \quad (\text{A6})$$

that I substitute for g in (A4) and (A5), obtaining the new system:

$$\dot{g}^e = \beta \left[\frac{g^Z(s - v(\delta + g^e)) - v \gamma g^e}{s - v(\gamma + \delta + g^e)} - g^e \right] \quad (\text{A7})$$

$$\dot{u} = u \left[\frac{g^Z (s - v(\delta + g^e)) - v\gamma g^e}{s - v(\gamma + \delta + g^e)} - u(\delta + g^e) + \delta \right] \quad (\text{A8})$$

At this stage we can build the Jacobian matrix, evaluated at the equilibrium values given by $\dot{g}^e = \dot{u} = 0$, which also imply $g = g^e = g^k = g^z$ and $u = u_n = 1$:

$$J^{\text{eq}} = \begin{pmatrix} \frac{-\gamma(s - v(\delta + g^Z))}{s - v(\gamma + \delta + g^Z)} & 0 \\ \frac{-(s - v(\delta + g^Z))}{s - v(\gamma + \delta + g^Z)} & -(\delta + g^Z) \end{pmatrix}$$

As it is recognizable from the imposition of the conditions for the local stability - $\text{Tr}(J^{\text{eq}}) < 0$ and $\text{Det}(J^{\text{eq}}) > 0$ - and remembering that, by construction, $s - v(\delta + g^Z) > 0$ must hold for the model to be demand driven and that $\gamma > 0$, the sufficient condition for the dynamic stability of the model in the neighborhood of the equilibrium is given by:

$$s - v(\gamma + \delta + g^Z) > 0 \quad (\text{A9})$$

that can also be expressed, in terms of the growth rate of autonomous demand, as:

$$g^Z < \frac{s}{v} - \gamma - \delta \quad (\text{A10})$$

In order to render more clear its economic meaning, we can rearrange condition (A9) - recalling that s is the aggregate marginal propensity to save $s = 1 - c(1 - \tau) + m$ - also as:

$$v(\gamma + \delta + g^Z) + c(1 - \tau) - m < 1 \quad (\text{A11})$$

which tells us that, to ensure the local stability of the model, the marginal propensity to spend has to be less than one. Otherwise, any variation in

investment aimed at restoring normal utilization after an eventual deviation from it would generate a variation in capacity and in output of the same proportion; hence, utilization would remain at its actual, undesired degree, without any possibility of coming back to the equilibrium represented by the *“fully adjusted”* Supermultiplier position.

Appendix B: A “Neo-Kaleckian” version of the Supermultiplier model

The basic ideas and conclusions of the Sraffian-Supermultiplier model can be found also in a recent formalization of a Neo-Kaleckian model which considers explicitly and properly autonomous demand (Allain, 2012, 2013, 2014), where properly means that the latter is assumed to grow at a rate independent from the output rate of growth and from the rate of accumulation. For the sake of simplicity, Allain discusses in these papers a model of a closed economy without credit-financed consumption, where growth is driven by government expenditure, the only autonomous component of demand included in an otherwise standard Neo-Kaleckian model (see the introductory chapter of this thesis). The author adds the further requirement of a balanced budget, obtained through the endogenization of the marginal tax rate: when the autonomously determined rate of growth of public spending varies, the tax rate adjusts accordingly, in order to maintain the equality between government expenditures and revenues.

Lavoie (2013) proposes a simplified version of Allain's model, discussing the similarities with Serrano's (Serrano, 1995, 1996) and finding the conditions for the local dynamic stability of his own augmented Neo-Kaleckian model. It is possible to summarize Lavoie's argument beginning with the accumulation and saving equations he adopts, respectively:

$$g^K = \alpha + \beta(u - u_n) \quad (\text{B1})$$

$$g^S = S/K = s_\pi \Pi u/v - Z/K \quad (\text{B2})$$

(B1) is a standard representation of a Neo-Kaleckian accumulation function (see equation 4 in the introductory chapter), where α is the “*expected growth rate of sales*” (Lavoie, 2013, p. 3) and the term $\beta(u - u_n)$ represents the idea of a

distinction “between undesired and desired excess capacity, or between the actual rate and the normal rate of capacity utilization” (ibid., p. 3). Z is autonomous demand, s_π is the marginal propensity to save out of profits, Π is the profit share, v is the normal capital-output ratio and u is the actual degree of capacity utilization. The saving function (B2) reflects the assumption that only capitalists save and is characterized by the inclusion of the term $(-Z/K)^{70}$, which differentiates it from the saving function presented in the introduction to this thesis and described there by equation (3).

Imposing $g^K = g^S$ and solving for the short-run equilibrium degree of capacity utilization, we obtain:

$$u^* = \frac{(\alpha - \beta u_n + Z/K)v}{s_\pi \Pi - \beta v} \quad (B3)$$

As Lavoie notices, given that the evolution of Z is determined by the exogenously given g^Z , the ratio of Z over K changes across time according to the rate of variation:

$$(Z/\hat{K}) = (Z/\dot{K}) / (Z/K) = (g^Z - g^K) = [g^Z - \alpha - \beta(u^* - u_n)] \quad (B4)$$

and, as long as the Keynesian stability condition holds⁷¹ (ibid., p. 6), it converges to the stable value $(Z/K)^{**}$. This position is characterized by the fact that the rate of accumulation has converged to the rate of growth of Z . This means that $g^{K**} = g^Z$, which we can solve for the long-run equilibrium value of the degree of capacity utilization:^{72,73}

70 Due to the inclusion of Z into the model, we have that $Y = C + I + Z$. Hence total savings are equal to $S = Y - C - Z$, from which we obtain, dividing by K and assuming that workers do not save, equation (B2).

71 Keynesian stability requires that savings are more reactive than investment to changes in the degree of capacity utilization. In terms of the model discussed, this means that the inequality $s_\pi \Pi / v > \beta$ has to hold.

72 Substituting u^{**} for u in (B2) and equating the resulting g^{S**} to $g^{K**} = g^Z$, Lavoie finds also that $(Z/K)^{**} = (s_\pi \Pi u^{**}) / v - g^Z$.

73 The equilibrium given by $u^{**} = u_n + (g^Z - \alpha) / \beta$ and $g^{K**} = g^Z$, where autonomous demand is equal to autonomous consumption - $Z = B - (1 - c_\pi)rD$ - is the position towards which the Neo-

$$u^{**} = u_n + (g^Z - \alpha)/\beta \quad (B5)$$

As it is easily recognizable, the long-run equilibrium represented by $g^{k**} = g^{y**} = g^Z$ and $u = u^{**}$ is still characterized by capacity utilized at a level different from the desired one. In order to achieve normal utilization, Lavoie assumes that a further adjustment mechanism is at work, provided by entrepreneurs which revise their assessed trend growth rate of sales (ibid., p. 10) through the equation:

$$\hat{\alpha} = \frac{\dot{\alpha}}{\alpha} = \gamma(u^* - u_n) \quad (B6)$$

where γ is a positive adjustment coefficient.

The equilibrium solutions of the model augmented by (B6) are $g^{k**} = g^{y**} = g^Z$ and $u = u_n$. As Lavoie proves it (ibid., p. 11), the conditions for the local dynamic stability of the equilibrium, obtained through the analysis of the Jacobian matrix derived from the dynamic system given by (B4) and (B6), are given by the contemporary fulfilment of:

$$s_\pi \Pi / v > \beta \quad (B7)$$

$$\gamma < \beta \quad (B8)$$

The conclusion is that *“the system is stable as long as the effect of Harrodian instability is not overly strong. If this is so, depending on the values taken by the parameters, this system may come back straight to its fully-adjusted position, where $u^{**} = u_n$ and where $g^{k**} = \alpha^{**} = g^Z$, or it may whirl cyclically towards it”* (ibid., p. 11).

Kaleckian model with household debt, introduced in section 2 and described by equations (1)-(3), would converge without the imposition of the condition which states that the stock of debt has to grow in line with capital (see equation 4).

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

Abstract

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

Keywords: Income distribution, Investment function, Growth, Marglin-Bhaduri

Introduction

It seems fair to claim that the Post-Keynesian approach to economics, with its multifaceted declinations¹, has established itself as the most consistent and organic alternative to the dominant Neoclassical paradigm. Within Post-Keynesian macroeconomic theory, the Marglin-Bhaduri's contribution (Marglin and Bhaduri, 1990; Bhaduri and Marglin, 1990) on the relationship between income distribution and growth has progressively asserted itself as a benchmark model, a reference point that has originated and still gives rise to plenty of theoretical and empirical works, extensions and applications.² In this essay, I will point out some critical aspects of the Marglin-Bhaduri model that I find both in the original formulation and in the most recent literature inspired by it.

In its original and more general version (Marglin and Bhaduri, 1990), the model is constituted by a consumption function that positively depends on the degree of capacity utilization and negatively on the profit share³ and by an accumulation function, positively related with the degree of capacity utilization and the profit share. A net exports function, which depends negatively on both capacity utilization and the wage share, is added in the open-economy extensions (see for example Bhaduri and Marglin, 1990). Within this framework,

1 See Lavoie (2011).

2 Lavoie and Stockhammer (2012, p. 10) refers to it as "*The post-Kaleckian model of growth and distribution*" [italics added]. Other relevant contributions to this literature can be found in Bowles and Boyer (1995), Blecker (2002), Hein and Vogel (2008), Stockhammer, Onaran and Ederer (2009), Hein and Tarassow (2010), Onaran, Stockhammer and Grafl (2011), Stockhammer, Hein and Grafl (2011), Hein (2012), Lavoie and Stockhammer (2012), Onaran and Galanis (2012), with the last two being part of an ILO research project recently collected in a book and published as Lavoie and Stockhammer (2014).

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

the overall effect on aggregate demand and growth of a shift in functional income distribution depends on the parameters of the model, in particular the relative sensitivity of the components of demand to the profit share and to the degree of capacity utilization.

In spite of the fact that the literature inspired by the Marglin-Bhaduri model often claims that the only open question left is an empirical one - to assess econometrically whether a particular economy is wage or profit-led - it will be argued in this essay that some theoretical issues can nevertheless be raised. The original model neglects the existence of components of demand other than investment and induced consumption.⁴ A proper inclusion into the picture of these components will allow me to maintain that the treatment of investment appears to be the least convincing aspect of the approach *a là* Marglin-Bhaduri. More specifically, it seems possible to cast some doubts about an independent long-run influence of the profit rate or the profit share on investment, influence that is not in general justified or explained in detail in the relevant literature and that to some extent is simply taken for granted, making a generic reference to the actual profit share as an indicator of expected profitability and to profits as a necessary source of internal funds. In this respect, it will be shown that, once the original model is integrated with an explicit consideration of autonomous demand, income distribution does not exert any permanent influence on the rate of growth of the economy and on the rate of accumulation. Once this result is matched with the usual assumption made in Post-Keynesian and Neo-Kaleckian models⁵ of growth and distribution

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

5 With this last term, I refer to a series of models of growth and distribution whose first examples can be traced back to Rowthorn (1981) and Amadeo (1986). The Marglin-Bhaduri model can be attributed to this theoretical tradition. Its main novelty is represented by the

that the degree of capacity utilization is the adjusting variable in equilibrating investment and savings, we obtain paradoxical results that question the plausibility of an accumulation function like the one used in the discussed literature. In addition, the famous taxonomy introduced by the authors (stagnationist vs exhilarationist demand regimes; wage-led vs profit-led growth regimes) is proved to be problematic as well.

The essay proceeds as follows: in section 1, a baseline version of the Marglin-Bhaduri model is presented; in section 2, I introduce the autonomous components of demand into the model. This inclusion leads to paradoxical results, which allow me to cast some doubts about the investment function of the Marglin-Bhaduri model and the main findings of the entire approach. The last section summarizes the main results of the essay and draws some conclusions. In the Appendix, my argument is compared with two recent contributions that develop critiques to the Marglin-Bhaduri model apparently analogous to those expressed in the present essay.

1. A baseline version of the model

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

$$r \equiv \frac{P}{K} \equiv \left(\frac{P}{Y}\right) \left(\frac{Y}{Y^n}\right) \left(\frac{Y^n}{K}\right) \equiv \Pi \frac{u}{v} \quad (1)$$

accumulation function (see eq. 3 below), introduced because of the authors' dissatisfaction with the supposed rigidity of standard Keynesian theory, according to which higher wages always increase demand. Indeed "we view the Keynesian insistence on aggregate demand as an important ingredient to understand how modern capitalism works, but the stagnationist model as very much bound to particular places and times" (Marglin and Bhaduri, 1990, p. 155). Through the introduction of the profit share in the accumulation function, the authors' objective was to provide a more flexible theoretical framework, able to produce different demand and growth regimes.

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

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

where the first one is simply an accounting identity representing the rate of profit r as the product of the profit share Π , the rate of capacity utilization u and the inverse of the normal capital-output technical coefficient v . The second is the saving function, with the implicit assumption that only capitalists save (s represents their marginal propensity to save). The third is the accumulation function. The rate of accumulation is assumed to be a positive function of the expected rate of profit ($\frac{df}{dr^e} > 0$), which in turn is positively affected by the

profit share and the capacity utilization ($\frac{\partial r^e}{\partial \Pi} > 0$ and $\frac{\partial r^e}{\partial u} > 0$). As Marglin

and Bhaduri (1990, p. 163) explain: *“the first because the unit return goes up, the second because of the likelihood of selling extra units of output increases”*. In their attempt to explain the slowdown in growth in many western economies during the 1970s through the concept of *profit squeeze*, the authors justify the influence of the profit share on the accumulation rate also by regarding profits as *“an important source of saving, so the reduction of profits made less income available for accumulation”* (ibid., pp. 152-153). Incidentally, the last argument completely reverses the causality between savings and investment with respect to the standard Keynesian and Post-Keynesian view⁶ and it is hardly consistent with claims like *“the pace of accumulation is determined by firms’ decision to invest, independent of savings”* (Hein, 2012, p. 46), often made in the recent literature that develops the same theoretical framework and uses the same functions of

⁶ For a detailed discussion, see Garegnani (1978).

Marglin and Bhaduri (1990).

The equilibrium condition $g^S = g^K$ completes the model. From equations (1) to (3), we obtain:

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

Totally differentiating, we get $(s \frac{u}{v} - \frac{df}{dr^e} \frac{\partial r^e}{\partial \Pi}) d\Pi - (\frac{df}{dr^e} \frac{\partial r^e}{\partial u} - s \frac{\Pi}{v}) du = 0$, from

which we can derive an IS function - the locus of points where savings equalize investment - whose slope is equal to:

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

The sign of equation (5), even assuming that the standard Keynesian stability holds⁷ (the denominator higher than 0), cannot be established a priori, since it depends on the parameters and on the relative responsiveness of the accumulation and saving functions to variations in u and Π . If the numerator is positive, the economic regime is defined “*exhilarationist*” (Marglin and Bhaduri, 1990, p. 166), meaning that an increase in the profit share has a positive effect on the *level* of economic activity; if it is lower than 0, it is defined “*stagnationist*” (ibid., p. 166), entailing that an increase in the wage share is necessary to attain a higher *level* of aggregate demand.

It is important to recall that in the Marglin-Bhaduri theoretical construction, and more in general in Neo-Kaleckian models, a change in one of the exogenous parameters (as the profit share in the above example) leads to a new equilibrium level for the capacity utilization, as a consequence of a

7 The Keynesian stability condition requires that savings are more reactive to variations in the capacity utilization than investment.

variation in demand with given productive capacity. However, this new level of u persists over time. Indeed, in these models (i) no attempt is done to attain normal capacity utilization and (ii) the rate of accumulation and the rate of output growth are assumed to be coincident. Hence the numerator and the denominator of u evolve in parallel after the exogenous shock. This implies that the short-run outcome of a change in the profit share, which is represented by the variation in u , extends its effects also to the long-run, the time horizon usually referred to when economic growth is studied.

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

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

	EXHILARATIONIST	STAGNATIONIST
CO-OPERATIVE	profit-led	wage-led
CONFLICTUAL	profit-led	profit-led

Table 1: Taxonomy of economic regimes

We may recall that, according to equation (4), the rate of accumulation/rate of growth is proportional to the rate of profit. This implies that the only case for wage-led growth is given by the intersection of co-operation and stagnationism. In fact, in this last case an increase in the wage share leads, by definition, to an increase in the rate of capacity utilization.⁸ Being the regime co-operative, this also leads to an increase in the rate of profit⁹ and consequently in the rate of growth.

In any case, apparently, the interests of the capitalist class appear to coincide with the general interest. If the regime is exhilarationist – as it is possible to see in table 1, this always implies a profit-led growth regime - an increase in their income share has long period positive effects on growth. In a stagnationist situation, if the regime is co-operative a higher rate of profit goes along with higher growth again. If instead is conflictual, workers can obtain a bigger slice of the cake only at the expense of the size of the cake itself.

Notably, the temporal framework to which the model refers in its original version¹⁰ is claimed to be “*a longer run than the textbook short run in which capacity utilization is the sole adjusting variable*” (Marglin and Bhaduri, 1990, p. 167). On the other hand, in the twin paper (Bhaduri and Marglin, 1990, p. 384) “*the focus is entirely on the short period*” and the discussion is limited to the reactions of the *level* of aggregate demand to variations in the profit share, on the basis of the same concepts of stagnationist and exhilarationist regimes.

Traces of the dichotomy between these two different versions of the model can be found also in the following literature. In the spirit of Bhaduri and

8 Obviously, these two events have a positive effect on the wage bill.

9 In spite of the fact that the profit share is now lower, the positive effect on r of a higher u , in this case, prevails.

10 It is also shorter than the very long-run in which, according to the authors, rational expectations are supposed to work.

Marglin (1990), some recent works like Stockhammer, Onaran and Ederer (2009), Stockhammer, Hein and Grafl (2011), Onaran, Stockhammer and Grafl (2011) and Stockhammer and Onaran (2012) confine their analysis to the short-run. The terms “*wage-led*” and “*profit-led*” are utilized there to identify regimes in which the increase in the wage share has, respectively, positive and negative effects on the *level* of demand.¹¹ Since in these last cases productive capacity is taken as given and fixed, a variation in demand leads to a variation in the degree of capacity utilization in the same direction. Hence, the two possible scenarios correspond to the stagnationist and exhilarationist of Marglin and Bhaduri (1990). Lavoie and Stockhammer (2012) distinguish between the impact of variations in functional income distribution on demand, qualified by them as the short-run effect and leading to wage-led and profit-led demand regimes, and the impact on the rate of accumulation - the long-run effect - that generates wage-led or profit-led investment regimes, which are analogous to the Marglin and Bhaduri (1990) growth regimes. Hein and Vogel (2008), Hein and Tarassow (2010) and Hein (2012) study both demand and growth regimes.

The discussion will concern, from now on, the original version of the model, as presented in Marglin and Bhaduri (1990), to assess both its level and growth outcomes. Moreover and for the sake of simplicity, the present analysis will focus exclusively on the effects of changes in income distribution on the equilibrium level of capacity utilization¹² (with the related distinction between stagnationist and exhilarationist regimes) and on the rate of growth of the economy (profit-led versus wage-led regimes), leaving aside the co-operation/conflict dichotomy.¹³

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

12 Capacity utilization is treated as a proxy of the level of demand.

13 For a critical discussion of these aspects, see Cavalieri, Garegnani and Lucii (2004).

A simple graphical analysis can be useful to capture the main features of the model and to introduce my criticisms. I utilize a linear specification¹⁴ of equation (3), expressed by equation (6):

$$g^K = \alpha + \beta u + \gamma \Pi \quad (6)$$

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

$$g^S = \frac{S}{K} = \frac{s_\pi \Pi Y + s_w (1 - \Pi) Y}{K} = s(\Pi) \frac{Y}{K} = s(\Pi) \frac{u}{v} \quad (7)$$

with $s(\Pi)$ equal to the aggregate marginal propensity to save. The latter is a positive function of the profit share, on the basis of the assumption that the marginal propensity to save out of profits s_π is higher than the propensity to save out of wages s_w , as it is commonly done in the heterodox literature.¹⁵ Equations (6) and (7) can be reported in Figure 1¹⁶, with g^K and g^S expressed as increasing functions of u .¹⁷

14 For the provision of arguments in favor of such a formalization of the Marglin-Bhaduri investment function, see Hein and Vogel (2008, p. 485, footnote 1). Equation (6) is also consistent with Marglin and Bhaduri's own approach, which treats "profit share and capacity utilisation as independent and separate arguments in an investment function" (Bhaduri and Marglin, 1990, p. 380).

15 See for example Kaldor (1955-56).

16 Lavoie and Stockhammer (2012, p. 11) present a similar graphical representation of the Marglin-Bhaduri model.

17 Given that the Keynesian stability is assumed to hold, the g^S curve is steeper than g^K .

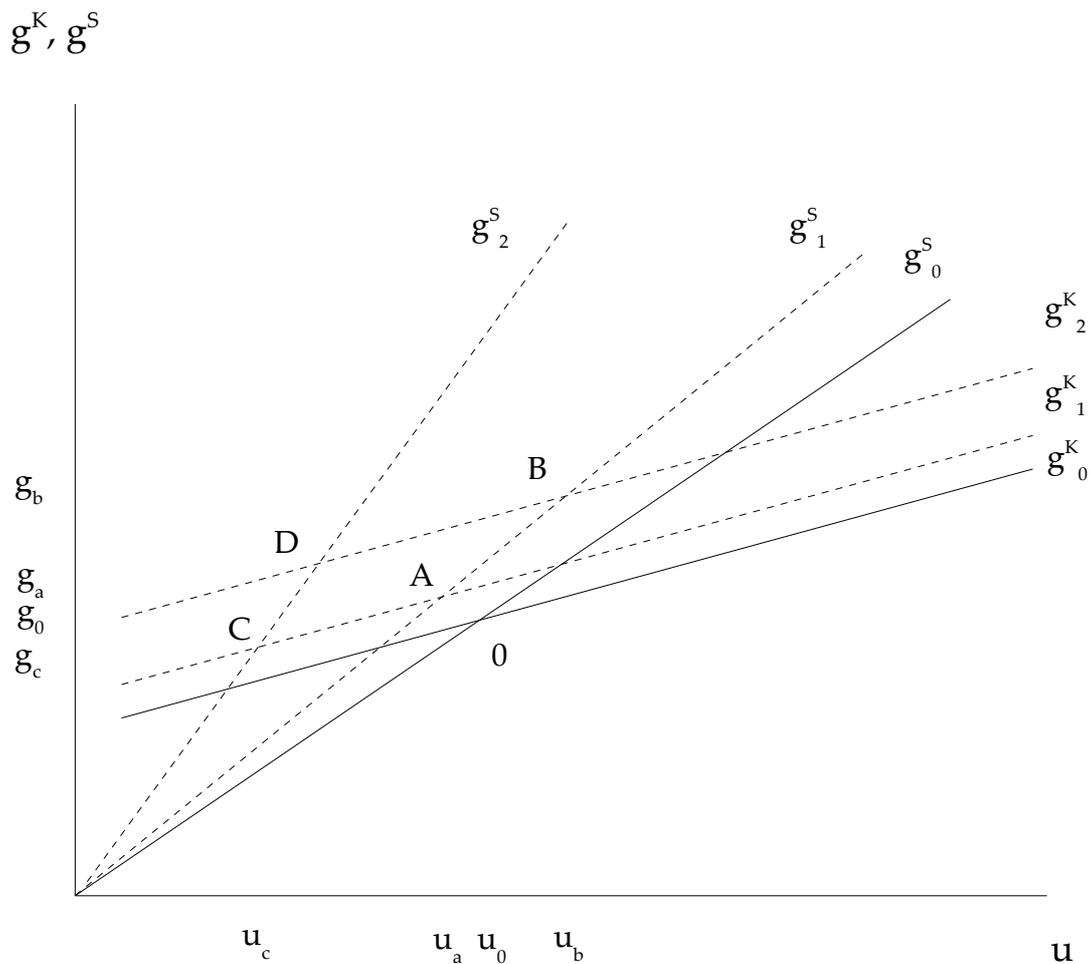


Figure 1: The effects of an increase in the profit share in a standard Marglin-Bhaduri model.

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

If the new situation of the economy is represented by the curves (g^K_1, g^S_1) ,

the corresponding equilibrium point A represents a stagnationist demand regime and a profit-led investment/growth regime, as can be seen respectively on the u -axis and the g -axis and recalling that u , coherently with Marglin and Bhaduri (1990), is utilized as a proxy for demand.

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

If, finally, consumption is very sensitive to variations in functional income distribution and the saving function rotates up to g^S_2 while the impact on investment is still represented by g^K_1 , the intersection point C reveals a stagnationist demand regime and a wage-led investment/growth regime.¹⁸

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

2. Some critical aspects of the model

a. The Marglin-Bhaduri model and autonomous demand

The Marglin-Bhaduri model is built under the assumptions of a closed economy, without government and no possibility for credit-financed consumption. Hence, it does not consider the existence of components of aggregate demand other than induced consumption and investment. Given their relevance and their undeniable existence in real-world economies, I will include into the picture these components – the autonomous demand – arguing

¹⁸ The possible equilibrium given by the intersection of g^K_2 and g^S_2 (point D), is characterized by regimes analogous to those of point A.

that this leads to two main results: (i) the taxonomy introduced in table 1 no longer holds; (ii) the Marglin-Bhaduri accumulation function appears questionable.

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

It can be reasonably assumed that firms' objective is to produce in the most efficient, cost-minimizing way; that is to say they aim at operating their productive capacity at its 'normal' level, as defined for example by Kurz (1986) and Shaikh (2009)¹⁹, which will be in general lower than full utilization.

Finally, to appreciate properly the fundamental role of investment, it is necessary to take into account also its double nature, because this allows a proper analysis of the persistent and non transitory effects on the economy of a shift in income distribution. Indeed, investment is the driving force of the productive capacity and of the potential output of an economy. At the same time, it is also an important component of aggregate demand. Its evolution contributes, together with the other components of demand, to the determination of the rate of growth of aggregate demand and actual output. As it will be argued below, the absence of autonomous demand in the Marglin-Bhaduri model does not allow a full recognition of investment's double role.²⁰

19 "The 'normal' degree of capital utilization refers to the cost-minimizing system of production" (Kurz, 1986, p. 38); "The normal rate is determined by the (real) cost structure of the firm ... the minimal cost rate of capacity utilization is largely immune to variations in the actual rate of capacity utilization" (Shaikh, 2009, p. 461). See also the seminal contribution of Steindl (1952), with his introduction of the concept of "planned excess capacity" (p. 127) as a strategic choice of the firm to be able to meet efficiently peaks of demand and to discourage possible entrants.

20 See also Cardoso and Crespo (2014), where a similar argument is developed.

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

As it has been discussed above, the most “prudential” versions²¹ of the Marglin-Bhaduri model, those which confine their analysis to the effects on the *level* of aggregate demand and that I will not discuss in detail here, explicitly limit their focus to the short period, when productive capacity is fixed and eventual increases in the produced output can be brought about only through a more intensive utilization of the existing capacity.

On the other hand, the model originally presented in Marglin and Bhaduri (1990), which is the main object of my discussion, and its most “ambitious” following versions, claim to extend to the medium-to-long run the results. In doing this, they present some unsatisfactory aspects. A dichotomy seems in particular to be present: either potential output is still taken as given and fixed, with no room for the capacity generating effects of investment²², or it is assumed to be always growing in line with actual output. In this last case, it seems plausible to argue that the absence of an explicit distinction between a specific equation explaining the temporal evolution of productive capacity and an equation tracking the path of actual output can be attributed to the fact that

21 See Stockhammer, Onaran and Ederer (2009); Stockhammer, Hein and Grafl (2011); Onaran, Stockhammer and Grafl (2011) and Stockhammer and Onaran (2012).

22 This is explicitly admitted in Hein and Vogel (2008, p. 485) in the discussion of their equilibrium results: “Whereas equilibrium capacity utilization indicates equilibrium activity with *given* productive capacities...” [italics added] but this is quite at odds with their objective to investigate “the long-run relationship between distribution and growth” (p. 481).

Neo-Kaleckian models – and their Marglin-Bhaduri version - claim themselves to be investment driven. For this reason, there is the tendency to identify the rate of capital accumulation (I/K) with the rate of growth of demand and output. This is consistent with either (i) the neglect of the existence of the autonomous components of demand, as Marglin and Bhaduri (1990) do; or, alternatively, with (ii) the arbitrary assumption that these components grow at the independently determined rate of accumulation, as it is proposed by some other authors, according to which, for example, public spending G is “*a constant proportion of the capital stock*” (Blecker, 2002, p. 140), or credit-financed consumption is such that “*debt must grow at the same rate as the capital stock*” (Palley, 2014, p. 20). This, obviously, means that the rate of growth of these components is no longer autonomous at all, being by definition equal to g^K . Anyway, in both cases demand (output, the numerator of u) and productive capacity (potential output, the denominator of u)²³ evolve always at the same rate g^K and any equilibrium level of u obtained with given potential/normal output will be maintained also beyond the short-run, when the new productive capacity is installed.

Following the seminal contribution of Serrano (1995) and the further developments of Lavoie (2013) and Allain (2014)²⁴, it is possible to integrate the autonomous components of demand into a Marglin-Bhaduri model of growth and distribution. I qualify as autonomous those components that do not depend on the actual or expected level of output and whose rate of growth can be taken, in this framework, as exogenously given: autonomous consumption²⁵, public

23 From the definition of the given technical capital-normal output ratio $v = K/Y^n$, we can see that $g^{Y^n} = g^K$.

24 Lavoie (2013) and Allain (2014) provide a formalization of a Neo-Kaleckian model with some components of demand growing at a rate independent from the output rate of growth.

25 With this term, I refer to "the component of aggregate consumption that is not financed by the purchasing power introduced in the economy by capitalists' production decisions. The

expenditure, exports.

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

$$I = s_{\pi}\Pi Y + s_w(1-\Pi)Y - Z = S \quad (8)$$

where Z are the already mentioned autonomous components, while the other terms are analogous to those in equation (7). For the sake of simplicity, I will consider a closed economy.²⁶ Dividing all terms by K , the stock of capital, we can rewrite the IS equilibrium condition as:

$$g^K = s(\Pi) \frac{u}{v} - \frac{Z}{K} = g^S \quad (9)$$

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

We can imagine to start our analysis with an equilibrium situation, like point 0 in Figure 2, in which it is assumed that productive capacity is utilized at its normal, target level and that $g^K = g^S = g^Z (= g^Y)$. In this position, all the components of demand evolve at the same rate of growth. Moreover, also productive capacity grows in line with aggregate demand and u remains at its normal level.

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

purchasing power used to finance autonomous consumption comes from the monetization of accumulated wealth and/or the access to new credit finance" (Freitas and Serrano, 2013, p. 3).

²⁶ It will be argued below that the argument does not change in an open economy.

over time accordingly to:

$$\left(\frac{\dot{Z}}{Z}\right) = \frac{Z}{K}(g^Z - g^K) \tag{10}$$

and the g^S curve shifts as long as these two rates of growth diverge.²⁷

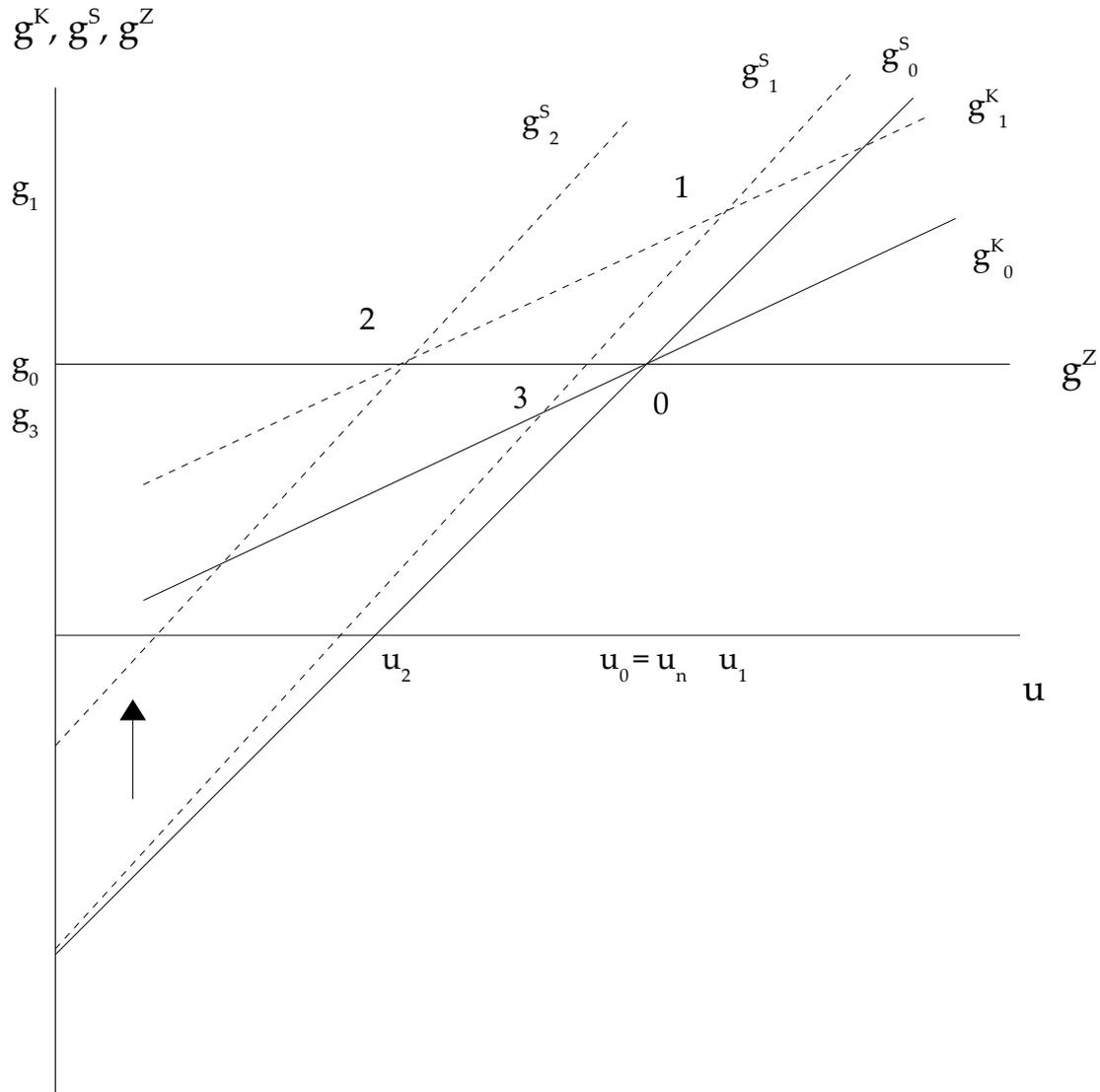


Figure 2: The effects of an increase in the profit share in a Marglin-Bhaduri model with autonomous demand: the exhilarationist, profit-led case.

²⁷ Lavoie (2013, p. 6) proves that the Keynesian stability condition – which is assumed to hold here - guarantees that the Z/K ratio converges to a stable equilibrium value, which also implies the convergence of g^K to the exogenously given g^Z .

On this basis, it is now possible to reconsider the cases showed above in the Figure 1. Beginning with an economic regime that should be, according to the previous definitions and in a standard version of the model, exhilarationist for what concerns demand and profit-led for growth²⁸, we see that the short-run effect of an increase in the profit share is the displacement of the economy from 0 to 1, as it happened in Figure 1 in the passage from 0 to B. As it is possible to see from the Figure 2, as soon as new productive capacity is built, that is to say as soon as investment starts to produce its long-run effects, the economy no longer remains in 1. In fact $g_1 > g^Z$ implies that the ratio of Z over the stock of capital gradually decreases and the g^S curve starts to shift upward, until the new equilibrium point 2 is reached, where again $g^K = g^S = g^Z$. Unless the variation in income distribution is capable of modifying g^Z , the rates of growth and accumulation of the economy are not affected. Besides, it may be useful to recall that in Neo-Kaleckian models capacity utilization is the adjusting variable of any exogenous shock and, if the equilibrium level for capacity utilization is different from u_n , there is no attempt to restore a normal level of utilization. Given this, in spite of having classified the model as exhilarationist – an increase in the profit share should cause an increase in the equilibrium degree of capacity utilization - according to the Marglin-Bhaduri terminology, the economy ends up, after the increase in Π , in a position of rest in which the equilibrium degree of capacity utilization is lower than in the starting point.

It should be noticed that the expansion of investment decided by capitalists after an increase in their income share goes against their own interests.²⁹ If, in fact, they did not shift their accumulation function, the

28 This implies that, after an increase in the profit share, we should expect a rise in the equilibrium level of u and an accelerating growth.

29 The argument works also in the case of a reduction of the profit share, in an analogous economic regime. Assuming that in the initial position capacity utilization is at its normal,

economy would move towards the intersection of g^k_0 with g^s_1 (point 3). But in this position $g_3 < g^z$ and the g^s curve would shift downward until the economy is back in 0, where the rate of profit is higher³⁰ than in 2 and production is carried on at the desired level of capacity utilization.

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

Given that:

$$\dot{u} = u(g^Y - g^K) \quad (11)$$

the reduction in the equilibrium capacity utilization is perhaps less surprising than in the case depicted in Figure 2, considering that in the transition from 0 to 1 total demand and the accumulation rate move in opposite direction, with the first one decreasing and second one increasing. The obvious result is that the capital endowment of the economy exceeds the productive requirements of firms, which have to run their plants at a sub-desired level. Furthermore, as in the previous case, the rate of accumulation tends to equalize the exogenously given g^z .

desired level, if capitalists react to a decrease in Π shifting down their accumulation function, they will end up in a new equilibrium situation with a higher capacity utilization, which means short-run extra profits but that it is not optimal in the long-run, the time span relevant for the computation of the normal degree of capacity utilization.

³⁰ See equation (1).

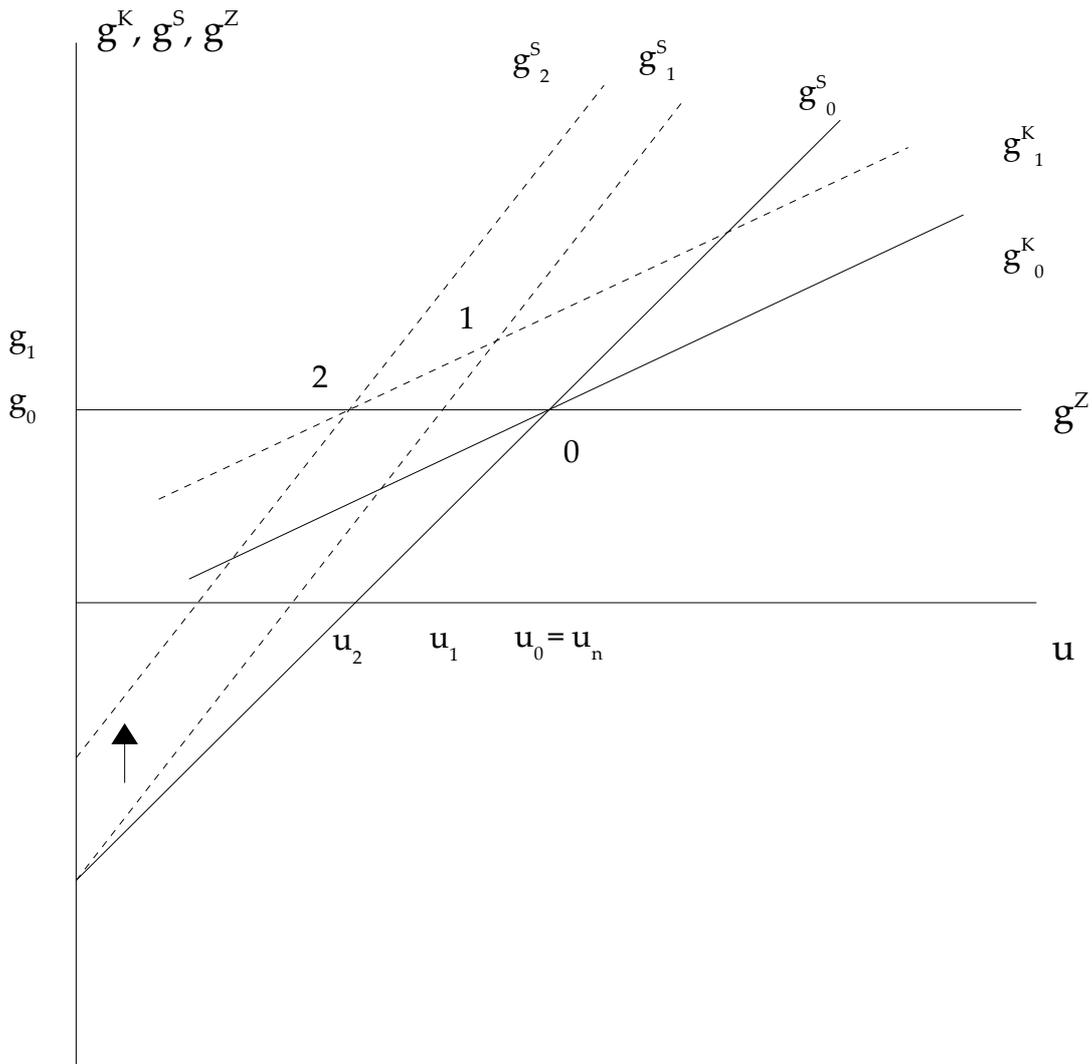


Figure 3: The effects of an increase in the profit share in a Marglin-Bhaduri model with autonomous demand: the stagnationist, profit-led case.

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

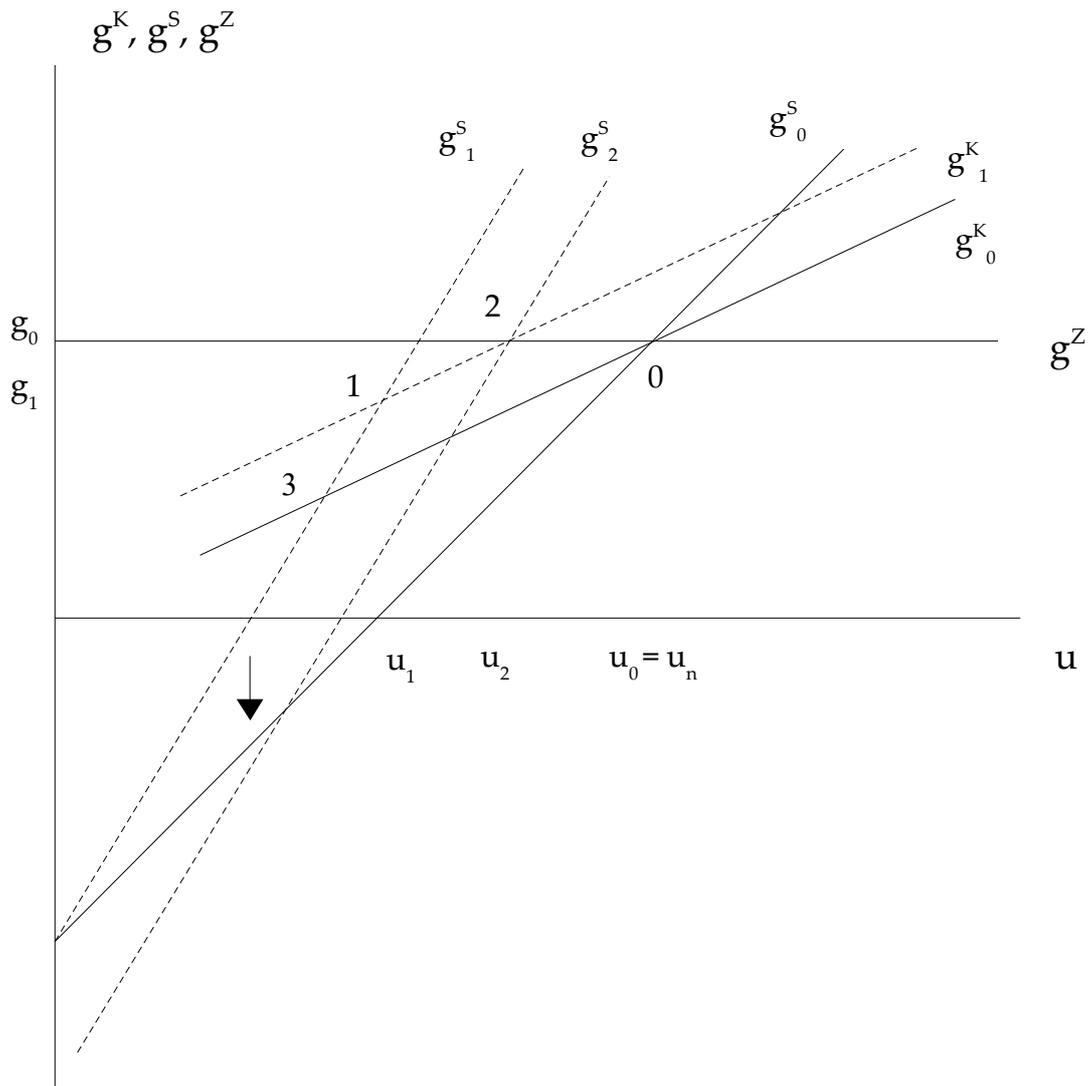


Figure 4: The effects of an increase in the profit share in a Marglin-Bhaduri model with autonomous demand: the stagnationist, wage-led case.

In the augmented version of the model adopted in this section, with Z into play, the increase in the profit share leads, in Figure 4, to a position - 2 - that is still stagnationist (the equilibrium degree of capacity utilization is reduced). However, with respect to the case depicted in Figure 3, the negative impact on u is relatively smaller, given that the accumulation of capital and aggregate

demand move, in the transit from 0 to 1, in the same direction, negative in the case under observation. Nonetheless, the fact that the g^k curve shifts upward makes the reduction in investment less than proportional to the reduction in aggregate demand, with the result that $u_2 < u_0$. On the contrary, if the accumulation function remained the original one, that is to say if capitalist did not positively react in the absence of a demand increase, the equilibrium degree of capacity utilization would be unaffected. Indeed, in this event the economy would move at first towards 3 and then come back to 0.

With the three examples above it has been shown that, if proper consideration is given to the existence of components of aggregate demand growing at a rate that is autonomous with respect to actual and expected income, a rate which is not arbitrarily assumed to be equal to the rate of capital accumulation and that is also largely independent from income distribution³¹, the analysis of a shift in functional income distribution, beyond the simple short-run, impact effect, leads to different results with respect to the Marglin-Bhaduri's ones.

b. The investment function of the Marglin-Bhaduri model

If no longer can be assumed that the rate of accumulation and the rates of growth of aggregate demand and output always coincide, with the former rate determining the other two, investment growing faster than aggregate demand causes a fall in capacity utilization (and vice versa). Coming back to the example depicted in Figure 2 and starting from point 0, in which capacity is

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

utilized at its desired, normal level, the increase in Π is assumed to have expansionary effects on demand, given a supposed positive impact on investment larger than the negative impact on consumption, so we get to point 1. In this way productive capacity grows for a while more than proportionally to aggregate demand and output, due to negative effects on consumption and to the presence of the autonomous components that, in principle, are not affected by the expansion of investment. As a result, after that the saving function has completed its adjustment through variations in the Z/K ratio, the economy ends up in a position such 2, in which firms have endowed themselves with more productive capacity than the one required to meet aggregate demand at the target degree of utilization. But there are not good reasons to expect such accumulation behavior from capitalists and, given the analogous results of Figures 3 and 4, it seems possible to cast some doubts about the model's aggregate investment function, in particular on an independent influence of the profit share.

A similar argument was developed, several decades ago, by Josef Steindl:

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

(Steindl, 1952, p. 131, italics added)

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

It appears possible to agree with the Austrian economist's argument, according to which an increase in the accumulation rate, stimulated by a rise in the profit share and not justified by an expected increase in aggregate demand, leads to over-accumulation. However, the premise (the accepted dependence of I on Π) which leads Steindl to consider these undesired variations in u as necessary and unavoidable, seems disputable. On the other hand, it appears more reasonable to argue that capitalists, being aware of the eventual negative³² effects of a rise in investment not matched by a correspondent increase in demand, will not react at all to an increase in their profit share.

A counterargument could be raised: at least in a regime that is both profit-led and exhilarationist, if we imagine for example an increase in Π , the initial increase in investment overcomes the negative impact on consumption

32 Negative not in general terms but for their own interests.

and triggers, through the multiplier, an aggregate increase in demand that might confirm the logic of the previous acceleration in capital accumulation. But this generates some doubts about the behavioral assumptions behind this conduct: either capitalists behave as imagined by Tugan-Baranovsky³³, according to whom investors do not perceive aggregate demand as a constraining factor as long as aggregate investment itself is high enough and *“machines were to produce machines for production of machines”* (Kalecki, 1967, p. 458) or they have a strong background in Keynesian theory and are confident that their first move will activate a suitable multiplier-driven reaction in consumption. Both cases seem not particularly compatible with the decentralized, competitive nature of capitalism. Anyway, even neglecting these perplexities, the final result is an over-endowment of capital stock - as it has been shown in Figure 2 - which depresses further investment and the realized profit rate and that would require a reduction in investment for several periods, in order to restore a desired level of capacity utilization.

Considering the other Marglin and Bhaduri's argument that some firms can be constrained in the amount they can borrow, due to low internal funds, and are not able to undertake investment projects, this does not imply that other firms, including new entrants, could not provide the investment necessary to meet demand requirements.³⁴ The neglect of capitalist competition appears as another weakness of the theorized investment behavior: if, independently from the actual profit share or even in the case of a reduction of it, capitalists do not take the opportunity given by an expansion of demand,

33 Sardoni (2015, pp. 151-152) provides a detailed discussion of the implausible outcomes and of several weaknesses of Tugan-Baranovsky's analysis. On Kalecki on Tugan-Baranovsky see also Cesaratto (2013), section 4.

34 See Petri (1993).

they will simply observe a reduction in their market share³⁵, in favor of competitors willing to satisfy the demand coming from the customers able to pay the normal prices.³⁶

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

Moreover, the interpretative power of the taxonomy introduced in table 1 is somehow downscaled: growth is neither wage nor profit-led, while the exhilarationist demand regime, defined as in Marglin and Bhaduri (1990), is no longer a feasible option. As shown in Figures 2-4, if the investment behavior is defined by equation (3), an increase in the profit share always leads to a reduction in the equilibrium degree of capacity utilization.³⁷

It seems possible to argue that, for a more satisfactory treatment of aggregate investment in a baseline model of accumulation and distribution, two paths are open: if a significant impact of variations in the profit share on investment is maintained, then a second-stage process of adjustment of the productive capacity to the long period level of demand must be modelled and discussed as well. In this case, the profit sensitivity would be ephemeral and temporary and it would be counteracted by firms' attempt to restore an adequate endowment of capital stock. As it is well known, this is not what

35 See Serrano (2004), in particular p. 14.

36 The prices, according to Serrano (2004, p. 14) that "allow firms to obtain the normal rate of profits, which defines the minimum accepted standard of profitability".

37 From simple computations, it is possible to see that the equilibrium degrees of capacity utilization of Figures 2-4 are given by $u_2 = (g^Z - \alpha - \gamma\Pi)/\beta$. For a formal analysis, see the subsection below, Lavoie (2013) and the Appendix B to the first essay of this thesis.

happens in Neo-Kaleckian models³⁸, where the equilibrium degree of capacity utilization bears the brunt of the equalization between investment and savings and it is, in principle, free to range between zero and full utilization. In this respect, the Marglin-Bhaduri version of the Neo-Kaleckian model presents the supplementary problem that not only production is carried over persistently at a level of u different from the desired one, but entrepreneurs exacerbate actively this situation with their deliberate investment behavior.

Given these difficulties, an alternative approach would regard investment as exclusively induced, depending on expected demand³⁹ (that forthcoming at normal prices) and quite insensitive to income shares. As Garegnani put it over fifty years ago⁴⁰, to argue the exclusion of the rate of profit from his analysis of the determinants of investment,

The rate of profit on new investments appears not to be a factor that influences investment independently of the two factors mentioned in the text (*Garegnani is referring to demand expansion and technical innovation*); it seems, rather, to be how the influence of those two factors manifests itself. Thus, if there is an increase in final demand, entrepreneurs will anticipate being able to sell additional quantities

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

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

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

of goods at current or higher prices, and investment will appear to be profitable, whereas it would not appear so without the increase in final demand ... In the economy as a whole, therefore, the total amount of profits, and hence of undistributed profits, will depend on the level of investment rather than vice-versa.

(Garegnani, 2015, pp. 11-12)

This appears confirmed by the findings of the most recent empirical contributions in the wage-led/profit-led literature. For example Onaran, Stockhammer and Grafl (2011) find that “*there is no long-run relationship between the profit share and investment*” (p. 649), Stockhammer, Hein and Grafl's (2011) results show “*a statistically insignificant effect of profits on investment*” (p. 8) and Onaran and Galanis' (2012) that “*the profit share has no statistically significant effect on investment*” (p. 17).

c. A simple, formal analysis of a Marglin-Bhaduri model with autonomous demand

It is possible to summarize the arguments presented in the subsections 2.a and 2.b by means of a formal analysis of a Marglin-Bhaduri model, integrated with an explicit consideration of the autonomous components of demand. For this purpose, I will rely on an analogous exercise, performed in Lavoie (2013), where the properties of a Neo-Kaleckian model⁴¹ of growth and distribution with autonomous demand are illustrated and discussed.

41 With this term, I am referring to a model whose accumulation function is described by $g^K = \alpha + \beta(u - u_n)$, as discussed in the introductory chapter of this thesis.

We can begin from the IS condition (9) - $g^k = s(\Pi)\frac{u}{v} - \frac{Z}{K} = g^s$ - introduced above and given by the equalization of the accumulation function (6) - $g^k = \alpha + \beta u + \gamma \Pi$ - and the saving function with autonomous demand $g^s = s(\Pi)u/v - Z/K$. Assuming an increase in the profit share, from Π to Π_1 , I solve (9) for the short-run equilibrium degree of capacity utilization, which corresponds to the positions u_1 of the Figures 2, 3 and 4. I obtain:

$$u_1 = \frac{\alpha + \gamma \Pi_1 + Z/K}{s(\Pi_1)/v - \beta} \quad (12)$$

I have already noticed that, independently from the specific economic regime, the economy moves away from u_1 as soon as investment starts to produce its long-run effects and the new capital stock is installed. Indeed, the Z/K ratio varies continuously so long as the rate of accumulation and the exogenously given rate of growth of Z diverge, through the law of motion (10) -

$$\begin{aligned} \left(\frac{\dot{Z}}{K}\right) &= \frac{Z}{K}(g^z - g^k) \text{ - which can be expressed as:}^{42} \\ \left(\frac{\dot{Z}}{K}\right) &= \frac{(Z/\hat{K})}{(Z/K)} = g^z - [\alpha + \beta u_1 + \gamma \Pi_1] \end{aligned} \quad (13)$$

Consistently with what Lavoie (2013) finds for the Neo-Kaleckian model with autonomous demand, it is possible to prove that the derivative of (Z/\hat{K}) with respect to (Z/K) is always negative, if the Keynesian stability condition holds.⁴³ As discussed above, this is the case for the Figures 1-4 and it amounts to say that the denominator of (14) - $s(\Pi_1)/v - \beta$ - is greater than zero:

42 See Lavoie (2013, p. 6).

43 As Freitas and Serrano (2015) notice, this assumption, usually labeled in the Neo-Kaleckian literature as Keynesian stability, is equivalent to maintain that output is demand-determined.

$$\frac{d(\hat{Z/K})}{d(Z/K)} = \frac{-\beta}{s(\Pi_1)/v - \beta} < 0 \quad (14)$$

From condition (14), it derives that the ratio of Z over K converges to a stable equilibrium value.⁴⁴ This also implies that the rate of accumulation converges to g^Z , as it happens in the Figures 2-4, where the economy is shown to tend to the positions labeled with 2, described by (u_2, g^Z) . From $g^K = g^Z$, it can be easily found that:

$$u_2 = \frac{g^Z - \alpha - \gamma \Pi_1}{\beta} \quad (15)$$

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

Conclusions

The proponents of the Marglin-Bhaduri approach praise the model for its supposed elasticity and capability of being able to provide various scenarios and regimes but, as I have attempted to argue in the present essay, this elasticity is to some extent artificial and depends on an implausible investment function. Moreover, the model neglects the existence of components of aggregate demand other than induced consumption and investment. Once these components are properly considered – where *properly* implies that they are not arbitrarily assumed to grow at the rate of capital accumulation, as it is done in some Neo-

⁴⁴ If Z/K increases (decreases), its rate of growth decreases (increases), until the latter approaches 0.

Kaleckian literature – it is possible to stress more clearly the weaknesses of the investment function.

It has been proved, by means of a simple graphical analysis, that the consideration of autonomous demand allows capacity and output to grow, during the disequilibrium adjustments, at different rates. On this basis, I have claimed that a rise in investment simply motivated by an increase in capitalists' income share generates an accumulation temporarily faster than the growth of aggregate demand and output. This implies an over-endowment of capital, which means producing the quantities demanded at a degree of capacity utilization inefficiently low. For this reason, I have raised doubts about an independent and persistent influence of the profit share or the profit rate on the aggregate investment behavior. Indeed the contingent existence, in the investment function, of a factor of permanent disturbance of the process of adaptation of the productive capacity to aggregate demand and output would simply lead to a production permanently and deliberately carried over with an unsatisfactory endowment of capital. This aspect transcends the standard critique, raised to Neo-Kaleckian models of growth and distribution, of the non plausibility of a steady-state equilibrium with a level of capacity utilization different from its normal level. If in that case the entrepreneurs' problem was one of passivity – the lack of reaction to an equilibrium level of u different from u_n - in the circumstance under discussion here capitalists contribute, with their own active investment behavior, to an outcome negative for their own interests. This allows us to conclude that it would appear preferable not to include functional income distribution among the arguments of the aggregate investment function, which has to be considered dependent on the expected rate of growth of aggregate demand.

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Appendix: Other critiques to the model: Skott and Pérez Caldentey – Vernengo

Associated to a strong popularity, in the last years the Marglin-Bhaduri model has faced also several critiques. In particular, it can be useful to discuss briefly two of them, apparently quite similar in the spirit and content to the present work.

Peter Skott has been one of the first heterodox economists who attempted a systematic critique of the Neo-Kaleckian models of growth and distribution, casting doubts about their theoretical and empirical relevance. His arguments move mainly along two lines: (i) to be a good approximation of reality, it makes little sense to characterize a position in which capacity utilization differs persistently from its normal level as an equilibrium; (ii) there is no reason to assume, in a growth model, that the Keynesian and Harrodian⁴⁵ stability conditions hold (Auerbach and Skott, 1988; Skott, 2010; Skott, 2012).

In his 2010 contribution (Skott, 2010), which discusses issues related to the argument of the present work, the author, after having claimed that an investment function like the Marglin-Bhaduri's one suffers from "*a low sensitivity of accumulation to variations in utilization*" (ibid., p. 108), develops a so-called Harrodian alternative model, with the following characteristics:

45 According to the author "if all firms try to reduce their utilization rates by increasing investment, the macroeconomic impact is an increase in aggregate demand, which aggravates the original problem" (Skott, 2012, p. 121) and on this basis he justifies Harrodian instability as a natural feature of real economies. Lavoie (2013), Freitas and Serrano (2013) and Allain (2014), after having introduced autonomous demand into their respective models, provide the conditions under which firms can attain a normal degree of capacity utilization, without generating Harrodian instability. This happens through variations in the investment share, which increases when $u > u_n$ and decreases otherwise, thanks to the stabilizing role of the autonomous components of demand. The macroeconomic impact of an increase in investment is an increase in aggregate demand, as pointed out by Skott, but the impact on potential output, the denominator of u , is more than proportional, as discussed above.

. a saving function (and symmetrically a consumption function) analogous to the Marglin-Bhaduri's one, given by $g^s = \frac{S}{K} = s(\Pi) \frac{u}{v}$ (ibid., p. 109), increasing in capacity utilization and in the profit share;

. a long-run accumulation function whose only argument is u : $\frac{I}{K} = \varphi(u)$, with $\varphi'(u) > 0$ and with the accumulation rate evolving over time according to

$$\left(\frac{\dot{I}}{K}\right) = \lambda(u - u_n);$$

. the assumption that in the long-run Keynesian stability does not hold⁴⁶:

$$\varphi'(u) > \frac{\partial \frac{S}{K}}{\partial u},$$

with investment being more sensitive than savings to changes in capacity utilization.⁴⁷

With these premises and apparently counterintuitively, the author maintains that the economy depicted by the model is always exhilarationist and profit-led.

The steady-growth solutions, obtained through the equalization of the investment and the saving function, are given by:

46 On the other hand, the Keynesian stability condition is assumed to hold in the short-run, because “the insensitivity (*to changes in aggregate demand*) is plausible in the short run, but changes in aggregate demand have lagged effects on investment, and a weak impact effect (which is required for the stability of the short-run Keynesian equilibrium) does not guarantee that the long-term effects of a sustained increase in aggregate demand and utilization will be weak as well” (Skott, 2010, p. 112).

47 There is a further, important characteristic of the model, which will not be discussed here because not strictly relevant to the argument of the present paper: for the author, the desired degree of excess capacity, that is to say the normal level of capacity utilization, is itself a function of aggregate demand. It is interesting to notice that this argument is very close to the point put forward by Neo-Kaleckian authors, criticized by Skott, to defend an equilibrium level of u different from u_n , on the basis of a supposed convergence of u_n towards the actual level of u . For a detailed discussion, see Hein, Lavoie and van Treeck (2012).

$$g^{eq} = f(u^{eq}) = s(\Pi) \frac{u^{eq}}{v} \quad (A1)$$

Totally differentiating with respect to the equilibrium level of u and to the profit

share, we have that $(f'(u^{eq}) - s(\Pi) \frac{1}{v}) du^{eq} - s'(\Pi) \frac{u^{eq}}{v} d\Pi = 0$, from which we

obtain:

$$\frac{du^{eq}}{d\Pi} = \frac{s'(\Pi) \frac{u^{eq}}{v}}{f'(u^{eq}) - s(\Pi) \frac{1}{v}} > 0 \quad \text{and} \quad \frac{dg^{eq}}{d\Pi} = f'(u^{eq}) \frac{du^{eq}}{d\Pi} > 0 \quad (A2)$$

given that $f'(u^{eq}) - s(\Pi) \frac{1}{v} > 0$, on the basis of the assumption of Keynesian instability.

It appears quite problematic to interpret the economic process behind conditions (A2), which states that the equilibrium degree of capacity utilization and the equilibrium rate of growth react positively to changes in the profit share. A pre-Keynesian⁴⁸ explanation could be the following: if, for example, the profit share rises, savings unambiguously increase. To maintain the equality between savings and investment - the IS condition - also u has to increase, to exert a positive influence on investment. The problem is that, in the light of the obvious fall in consumption, the only way for u to increase is through a preliminary increase in investment that, unless one is willing to accept the validity of the Say's law, appears completely unjustified.

More recently, Pérez Caldentey and Vernengo (2013) identify two main sources of inspiration for Post-Keynesian models of growth and distribution,

48 Pre-Keynesian because after the publication of *The General Theory* it is clear that a rise in the aggregate marginal propensity to save, when investment is determined independently from savings, leads to an adjustment that takes place through a decrease in the level of income.

respectively the work of Kaldor⁴⁹ and the contributions of Joan Robinson and Kalecki. The authors explicitly argue that the Marglin-Bhaduri model, ascribable to the second family, allows “*a limited role for demand ... the profit share component of investment represents supply side forces which tend to predominate over the accelerator which reflects demand side factors*” (Pérez Caldentey and Vernengo, 2013, p. 2). Moreover, they claim that instead investment must be “*determined by the adjustment of capacity to exogenous demand in order to reach the normal capacity utilisation, and it is essentially derived demand (the accelerator principle)*” (ibid., p. 8) and that “*firms would not invest more if profits went up, if there is no increase in demand*” (ibid., p. 9). So far the arguments present quite substantial similarities with the present paper.

Other aspects appear less convincing. First of all, according to the authors, in the Marglin-Bhaduri model the rate of growth of demand would tend to converge towards its natural, 'pseudo'-Harrodian natural rate of growth, with the consequence that “*demand (and capacity utilization) adjusts to the independently given full capacity utilization*” (ibid., p. 7) and full-capacity output represents a physical, technical limit to the expansion of output that cannot be overcome by demand.

As it has been argued above, it is indisputable that there is not, in the Marglin-Bhaduri model and more in general in the Neo-Kaleckian literature, an explicit separate discussion of how actual output, from one side, and full-capacity or normal output, on the other, evolve. But it appears more correct to guess that this is due to the fact that, given that autonomous components of demand are neglected or more or less implicitly assumed to grow in line with

⁴⁹ Later in the paper (Pérez Caldentey and Vernengo, 2013, p. 8, footnote 13) the authors clarify that what they call Kaldorian models are elsewhere in the literature also called Sraffian models.

the stock of capital, the rate of accumulation (determining the evolution of the capital stock and of the potential or normal⁵⁰ output, see footnote 20 in the essay) and the rate of growth of output always coincide. Investment, a component of demand, sets the pace for the evolution of potential output, but this last always moves in parallel with actual output. This also explains why, in Neo-Kaleckian models, equilibrium capacity utilization is persistently different from the desired level, given that, within the model, it is not possible to restore normal capacity through variations in the level of investment. In fact a change in the pace of capital accumulation would modify numerator and denominator of u in the same proportion. Furthermore, it does not even appear correct to maintain that, in the Marglin-Bhaduri model, demand converges to full or normal capacity output. As I have tried to show in section 1, the equilibrium degree of capacity utilization is equal to its target level only by a fluke and, in the case of discrepancies between actual and normal utilization, no attempt is done by firms to achieve the latter.

For what concerns the “constructive” part of the paper, its treatment of aggregate investment appears unsatisfactory (even if for reasons completely different from those discussed with respect to the Marglin-Bhaduri's formulation). Indeed it seems based on what could be called a “decelerator” mechanism, given that it is claimed (*ibid.*, p. 10) that I will be higher when u is lower and vice versa. The reasoning behind can be summed up in the following way: if u exceeds its normal level, meaning with this that $Y_t > Y_t^n$, investment decreases and so does the rate of growth of output, with Y_t converging to Y_t^n . It

50 The degree of capacity utilization and the technical coefficient v can be defined in terms of normal output ($u = Y/Y^n$, $v = K/Y^n$) as it is done in the present paper or in terms of potential output ($u = Y/Y^{pot}$, $v = K/Y^{pot}$), as for example in Marglin and Bhaduri (1990), but the argument does not change. In the first case, normal utilization corresponds to the unit ($u_n = 1$) while in the second case it is less than one and it is expressed as a fraction of full capacity output ($u_n = Y^n/Y^{pot}$).

appears complicated to find a behavioral rationale for entrepreneurs deciding to invest less when they are actually utilizing over-intensively their existing capital stock. Moreover, this conduct is not capable of adjusting capacity to demand, as the authors maintain. As it has been argued above, a reduction in investment certainly causes a reduction in demand and output (the numerator of the ratio defining u), but normal output, the denominator, diminishes more than proportionally and the overall effect on u is positive. For all these reasons, it does not even appear correct to claim that the model sketched by Pérez Caldentey and Vernengo can be seen as a dynamic version of the Supermultiplier model (ibid., p. 10) in which, independently of the particular specification of the investment function⁵¹, the rate of accumulation is a positive function of the rate of capacity utilization, as it happens also in the Neo-Kaleckian models.

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51 If for example $I_t = v(\delta + g^e_t)Y_t$, where δ is the rate of depreciation and g^e_t the expected rate of growth of demand, dividing by the stock of capital we obtain, for the rate of accumulation, $g^k = u(\delta + g^e_t) - \delta$.

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An empirical investigation into the autonomous demand-growth nexus*

Abstract

According to the Sraffian-Supermultiplier model, output growth is explained by the evolution of autonomous demand. This model has been object of an intense theoretical debate, but few attempts have been done to test empirically its propositions. With this paper, we attempt to take a step forward in this direction. For this purpose, we calculate time-series of the autonomous components of aggregate demand and of the supermultiplier for the US, France, Germany, Italy and Spain and describe their qualitative patterns in recent decades. We find that European countries experienced a strong decrease in the supermultiplier, while in the US it has remained broadly stable and significantly higher than in the other four countries of the sample. In a specular way, the autonomous demand share in output has decreased in the US and increased in the European countries throughout most of the time sample. We observe that changes in output and in autonomous demand are tightly correlated, both in the long and in the short-run. Consistently with the theory, we find that where the supermultiplier is more stable, i.e., in the US, autonomous demand and output are cointegrated. Besides, the estimation of a Vector Error-Correction Model (VECM) reveals short-run simultaneous causality between autonomous demand and output. We propose an explanation based on the idea that autonomous demand is socially and historically determined. We then estimate the multiplier of autonomous spending through an Instrumental Variables approach, finding that a one dollar increase in autonomous demand raises output by 1.4 dollars over four years. We also test against empirical evidence the main adjustment mechanism of the model, according to which accelerations in autonomous demand growth should be followed by increases in the investment share. Through Granger-causality tests, we find that this is the case in all five countries.

Keywords: Growth, Effective Demand, Supermultiplier

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Introduction

According to the Sraffian-Supermultiplier model (Serrano, 1995, 1996), the autonomous components of demand (credit-financed consumption, public spending and exports) are the main drivers of output growth. Coherently with the Classical approach, income distribution is treated as exogenously determined by social and historical factors, affecting the relative bargaining power of the opposite classes. Finally, investment is fully induced by the evolution of output and the investment share reacts to discrepancies between the actual and the normal degree of capacity utilization. Due to this mechanism, the model is able to display an equilibrium solution where capacity is utilized at its normal, desired level.

Since the seminal contribution of Serrano (1995), an intense theoretical debate has taken place (Trezzini, 1995 and 1998; Barbosa-Filho, 2000; Park, 2000; Palumbo and Trezzini, 2003; Dejuán, 2005; Smith, 2012; Allain, 2014; the symposium on Sraffian economics and demand-led growth recently published on the *Review of Political Economy*, 2015). The model has also been utilized as an interpretative tool for historical tendencies in demand and output in single countries (Medici, 2010; Amico et al., 2011; Freitas and Dweck, 2013) but only few attempts have been done to test empirically its main predictions (e.g. Medici, 2011, which studies the case of Argentina). With the present work, we intend to perform a first systematic and multi-country empirical test of the implications of the Supermultiplier model. For this purpose, we build time series of the autonomous components of aggregate demand and of the supermultipliers for the US and four major European countries, characterized by different economic structures.

After comparing descriptively the recent dynamics of output, autonomous demand and of the supermultiplier in these countries, we test empirically three main implications of Supermultiplier theory: (a) for any given value of the supermultiplier, the trend growth rate of output converges to the trend growth rate of the autonomous components of aggregate demand; (b) positive changes in autonomous demand cause positive changes in output (again, for any given supermultiplier); (c) a higher growth rate of autonomous demand is associated with a higher investment share in output. In order to test these hypotheses, we employ cointegration analysis, IV (Instrumental Variables) regressions and Granger causality tests.

The paper proceeds as follows: section 1 introduces the theoretical model; section 2 presents the time-series of autonomous demand and of the supermultiplier the US, France, Germany, Italy and Spain. A qualitative analysis is sketched. In section 3 the econometric tests are performed, in order to assess empirically the relationship between autonomous demand and output growth. An important corollary of the theory, namely the positive relationship between the rate of growth of autonomous demand and an endogenous investment share, is also subjected to empirical appraisal. The conclusions summarize the main results and findings of the paper.

1. Autonomous demand and economic growth: theoretical background

It can be useful to recall briefly the Supermultiplier model (Serrano, 1995, 1996) presented in the first essay of this thesis, utilizing a slightly modified and simplified version of it.

The purpose of the model is to determine output according to the

principle of effective demand, through an integration of the traditional Keynesian multiplier with an investment function based on the accelerator principle, in its flexible version.

We can start with the output equation:

$$Y_t = c(1-t)Y_t + I_t + Z_t - mY_t \quad (1)$$

where Y_t , the current level of output, is equal to aggregate demand. The latter is the sum of induced consumption, investment and the autonomous components of demand (Z), minus imports. As usual in the literature, c is the marginal propensity to consume, t is the tax rate and m the marginal propensity to import.¹

With the term Z we refer to the sum of all the components of demand that are independent from the actual or expected level of output: autonomous, credit-financed households' consumption (C_0), public expenditure (G) and exports (X). Formally:

$$Z_t = C_{0t} + G_t + X_t \quad (2)$$

Differently from other heterodox contributions on growth and distribution², investment is treated as completely induced: productive units invest to endow themselves with the capacity necessary to produce the amount they are demanded at normal prices.³ In its simplest version, this can be represented by:

$$I_t = h_t Y_t \quad (3)$$

where h is the investment share in output (or, as Freitas and Serrano, 2013, p. 4, call it, "*the marginal propensity to invest of capitalist firms*").

1 The consumption and import functions are assumed to be linear for the sake of simplicity.
 2 See for example the Marglin-Bhaduri model (Marglin and Bhaduri, 1990), discussed in the second essay of this thesis.
 3 It emerges clearly from a vast empirical literature that output growth is the main determinant of investment, while the interest rate and the profit rate exert a much weaker influence, if any (see for example the review in Chirinko, 1993).

To sum up, we have that the level of output is equal to the product of the autonomous components of demand and the so-called Supermultiplier⁴:

$$Y_t = \frac{Z_t}{1 - c(1-t) + m - h} \quad (4)$$

Another relevant difference with other demand-led and non-neoclassical models on the same issues⁵ is that the investment share is endogenously determined, adjusted on the basis of the desire of entrepreneurs to achieve, in the long-run, a production carried over at the normal, desired level of capacity utilization. In fact there is no guarantee that in a position like the one depicted by equation (4) the existing stock of capital is utilized at its desired intensity. For this reason firms are assumed to be continuously attempting to adjust their productive capacity, investing more when there is over-utilization and less otherwise, according to the equation:

$$\dot{h} = h_t \gamma (u_t - 1) \quad (5)$$

γ is a positive reaction coefficient, u_t the actual and $u_n = 1$ the normal degree of capacity utilization. The former is defined as Y_t/Y_t^n ; Y_t^n is the normal level of output entailed by the existing capital stock, that is to say the level of output obtained utilizing normally and in the cost-minimizing way the existing productive capacity. In general normal output will be lower than potential, full-capacity output, defined as Y_t^p .⁶

From equation (4) it is possible to derive the rate of growth of the economy, given by:

4 For meaningful results, it is assumed that $1 - c(1-t) + m - h > 0$.

5 See Freitas and Serrano (2013) for a detailed discussion and comparison.

6 See Steindl (1952), Kurz (1986) and Shaikh (2009) for accurate definitions of normal capacity utilization and for the provision of arguments in favor of normal output being less than full-capacity output.

$$g_t^Y = g_t^Z + \frac{\dot{h}}{s+m-h} \quad (6)$$

where we define s , the tax-adjusted aggregate marginal propensity to save, as $s = 1 - c(1-t)$. As it is possible to notice, equation (6) is defined under the implicit assumption that the parameters c , t and m are constant, given their exogeneity with respect to the model and the absence of plausible equations describing their time paths.

The rate of capital accumulation, from (3), is equal to:

$$g_t^K = h_t u_t / v - \delta \quad (7)$$

where v is the normal capital-output ratio⁷ and δ is the rate of capital depreciation.

If we introduce an explicit consideration of the dynamic behavior of capacity utilization:⁸

$$\dot{u} = u_t (g_t^Y - g_t^K) \quad (8)$$

it is possible to study the dynamic system given by equations (5) and (8), whose equilibrium position ($\dot{h} = \dot{u} = 0$) is characterized by:

$$g_t^Y = g_t^K = g_t^Z$$

$$u_t = 1 \text{ and } h^{eq} = v(g_t^Z + \delta).^9 \quad (9)$$

If the rate of growth of autonomous demand is sufficiently persistent, output and productive capacity tend to the position represented by the so-called “*fully adjusted*” Supermultiplier (Cesaratto, Serrano and Stirati, 2003, p. 44), all the relevant variables evolve according to the rate of growth of the autonomous components, capacity is normally utilized and entrepreneurs

7 For the sake of simplicity, it is assumed that the technical coefficient $v = K_t/Y_t^n$ is given and fixed, being technological progress out of the scope of the present work.

8 From the definition of the technical coefficient v it is possible to derive $g_t^{Y^n} = g_t^K$.

9 For an explicit analysis of the dynamic stability of the model, see Freitas and Serrano (2013, 2015).

adjust their investment share in order to maintain this desired level of utilization.

It is useful to recall that, while a relevant majority of Post-Keynesian and Neo-Kaleckian demand-led growth models tend to be in general investment-driven¹⁰, in the Supermultiplier case the long-run trend growth rate of the economy is determined by the growth path of autonomous demand. Nonetheless, a higher rate of growth of the economy still goes along with a higher investment share, as it has already been discussed in the first essay of this thesis, but the direction of causality is reversed with respect to the Neo-Kaleckian case, going now from the rate of growth of autonomous demand to the dynamics of investment.

On the basis of the above discussion, we can identify three hypotheses implied by Supermultiplier theory that can be tested against empirical evidence:

- H1: For any given value of the supermultiplier (SM), the trend growth rate of output converges to the trend growth rate of the autonomous components of aggregate demand (Z).
- H2: Positive changes in Z cause positive changes in output (i.e., Z exerts a multiplier effect on GDP).
- H3: A higher growth rate of Z is associated with a higher investment share in output (see also the footnote 41 in the first essay of this thesis).

In the remainder of the paper we test these hypotheses empirically, using macroeconomic data for the US, France, Germany, Italy and Spain. In 2.a we

¹⁰ See Lavoie (2006, ch. 5) for an exhaustive overview.

explain the construction of the series of Z and SM, while 2.b describes and briefly comments the dynamics of output, autonomous demand and the supermultiplier in our sample. Section 3 presents the econometric tests. Sources for all variables are provided in Appendix A.

2. Autonomous demand and economic growth: stylized facts

a. Construction of the time-series of Z and SM

Autonomous demand - Estimates of exports and government expenditure¹¹ are routinely provided by national accounts. Indeed, in constructing a time-series of Z, the main task is that of choosing an empirical counterpart for autonomous consumption (C_0). Autonomous (as opposed to induced) consumption is defined as that part of household consumption that is not financed out of current income. Rather, it is financed out of endogenous credit money or accumulated wealth.

For our purposes, it is appropriate to classify dwellings as durable consumption goods rather than investment goods, as they do not contribute to the expansion of productive capacity. We can thus identify two components of C_0 : consumption spending financed by consumer credit¹² and house construction financed by residential mortgage credit. With respect to the first, it appears reasonable to assume that consumption goods are purchased as soon as credit is conceded. Cars, computers, TVs and washing machines – to mention some of the most common examples – are provided to households at the moment when the credit line is opened. So we can estimate this component of

11 With this term we refer to final consumption expenditure of general government and general government gross fixed capital formation.

12 Unfortunately, there is not an obvious way of quantifying the share of consumption financed by accumulated wealth.

C_0 on the basis of net flows of consumer credit.¹³

Things are different in the case of residential mortgages. It would be unrealistic to assume that new houses are provided at the very moment the mortgage is approved, if only because construction takes considerable time. The flow of construction spending takes place gradually across several months (after the residential mortgage is opened or before¹⁴). It thus appears safer to employ residential investment as our empirical measure of autonomous residential spending, under the assumption that the share of dwellings bought with cash is negligible.¹⁵

We will thus calculate autonomous consumption in each period, when possible, as the net flow of consumer credit (CC) plus residential construction spending (RES):

$$C_0 = CC + RES \quad (10)$$

For France, Germany and Italy, where quarterly data on consumer credit are not available for the entire sample, we exclude this component. In doing this, we are reassured by the available evidence, which suggests that consumer credit in Europe has been exiguous relative to residential investment and to the other components of Z (see Appendix B).

The supermultiplier - Given our theoretical definitions (eq. 4), the supermultiplier (SM) depends on the tax-adjusted propensity to consume ($c[1-t]$), the propensity to import (m) and the investment share (h). We employ the share of imports in

13 We employ net inflows, rather than gross, because in this way we take into account the fact that when households repay a share of previously opened debts, these fixed amounts are subtracted from current consumption independently of the current level of income, so in this sense they represent 'negative' autonomous spending.

14 Often the developer starts building the home before it is sold.

15 Note that in any case, even when paid by cash, dwellings are surely not financed out of current income, so in this sense they fit our definition of autonomous spending (the median price of a new house is worth several times the median yearly income in all countries).

GDP as a proxy for m . Given the stylized linear consumption function, we employ $1 - C/\text{GDP}$ (where C is total induced household consumption) as a proxy for the term $[1-c(1-t)]$. The investment share is simply calculated as I/GDP , where I is private non-residential investment.

b. Autonomous demand and economic growth in the US and in Western Europe: the stylized facts

We employ data on the US and four European countries. We try to encompass heterogeneous economic regimes and different growth strategies: the leading world economy; Germany and its export-led option; France and the economic activism of its public sector; Spain of the real estate bubble and Italy, two southern countries that after the crisis have been usually included in the Eurozone periphery (see Cesaratto and Stirati, 2011 and Stockhammer, 2013). For each country we constructed the longest possible quarterly time-series given data availability: the whole post-WWII period for the United States and a much shorter period (which varies between the last 35 years for France and 18 for Spain) for the European countries.

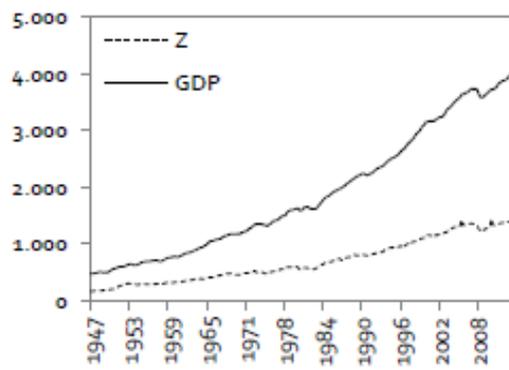
b.1 Growth in autonomous demand and output

United States - Our sample period for the US (1947:Q1 to 2014:Q1) starts with the 1946-1949 slump, mainly due to the withdrawal of government wartime spending and the weakness of external demand (Armstrong et al., 1991, p. 73). Recession ended in 1950, when the burst of the Korean war triggered a strong upswing led by military expenditure (ibid., pp. 106-109). Like

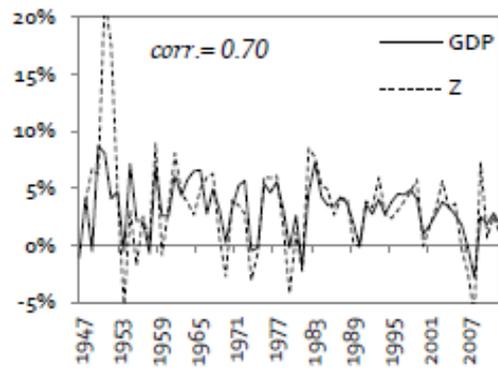
other western economies, the US then entered a 'Golden Age', with GDP growing at an average annual real rate of 4.3% between 1950 and 1973. The 'Golden Age' was characterized by fast productivity growth, fiscal and monetary demand management policies, rising real wages, decreasing inequality and regulated financial markets. Following a 'mini-boom' in 1972-1973, the late Seventies and early Eighties were characterized by an evident slowdown (GDP increased by 2.3% per year between 1973 and 1983). Growth somehow rebounded since the early Eighties, before the explosion of a Great Recession in 2008-2009, followed by a relatively weak recovery (See Figure 1, panel b). The 'Neoliberal cycle' (Vercelli, 2015), experienced since the Eighties, displays opposite features with respect to the 'Golden Age', being characterized by market deregulation (especially in the financial sector), worsening income distribution and a reduction in the economic role of the State.

European Countries – Our shorter sample periods for the European countries are instead entirely comprised in the Neoliberal Cycle. They depict, in general, a time span of similar steady and relatively moderate paths of GDP growth, interrupted by the outburst of the Great Recession between the second half of 2008 and the beginning of 2009. In the afterward of this event, performances tend to differentiate: Germany recovers rapidly, France stagnates while Italy and Spain suffer most.

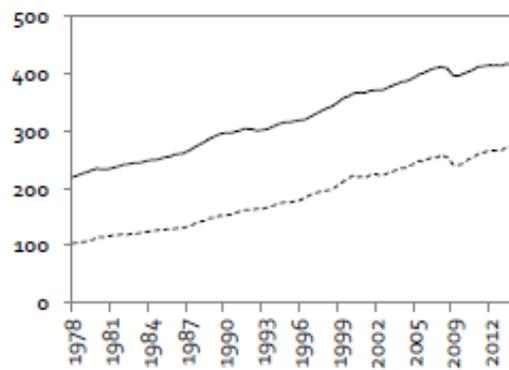
As it is possible to see in Figure 1, in all cases GDP and autonomous demand have been on a quite parallel path and their yearly rates of growth have been tightly correlated.



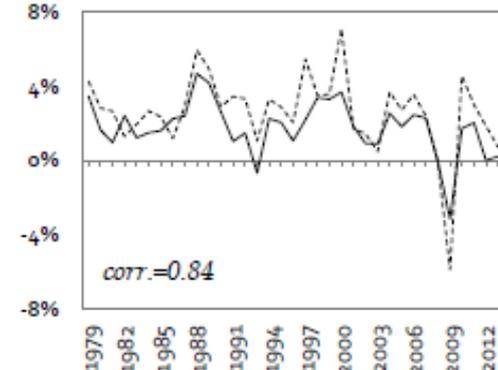
USA - (a) Billions of chained 2009 US Dollars



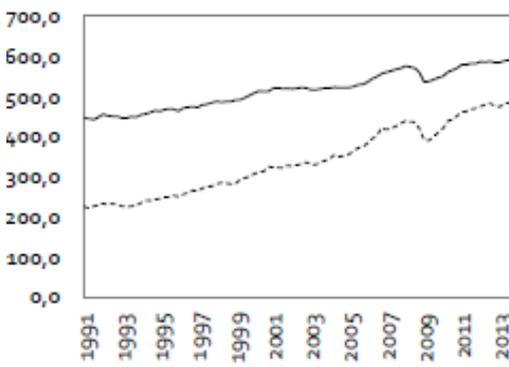
(b) Yearly % changes



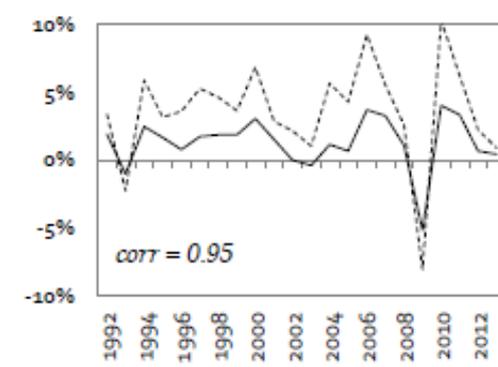
France - (c) Billions of chained 2000 Euros



(d) Yearly % changes



Germany - (e) Billions of chained 2000 Euros



(f) Yearly % changes

Figure 1a: Autonomous demand (Z) and Gross Domestic Product (GDP) (USA, 1947-2013; France, 1978-2013; Germany, 1991-2013)

Source: Authors' own elaboration on various sources (see appendix A)

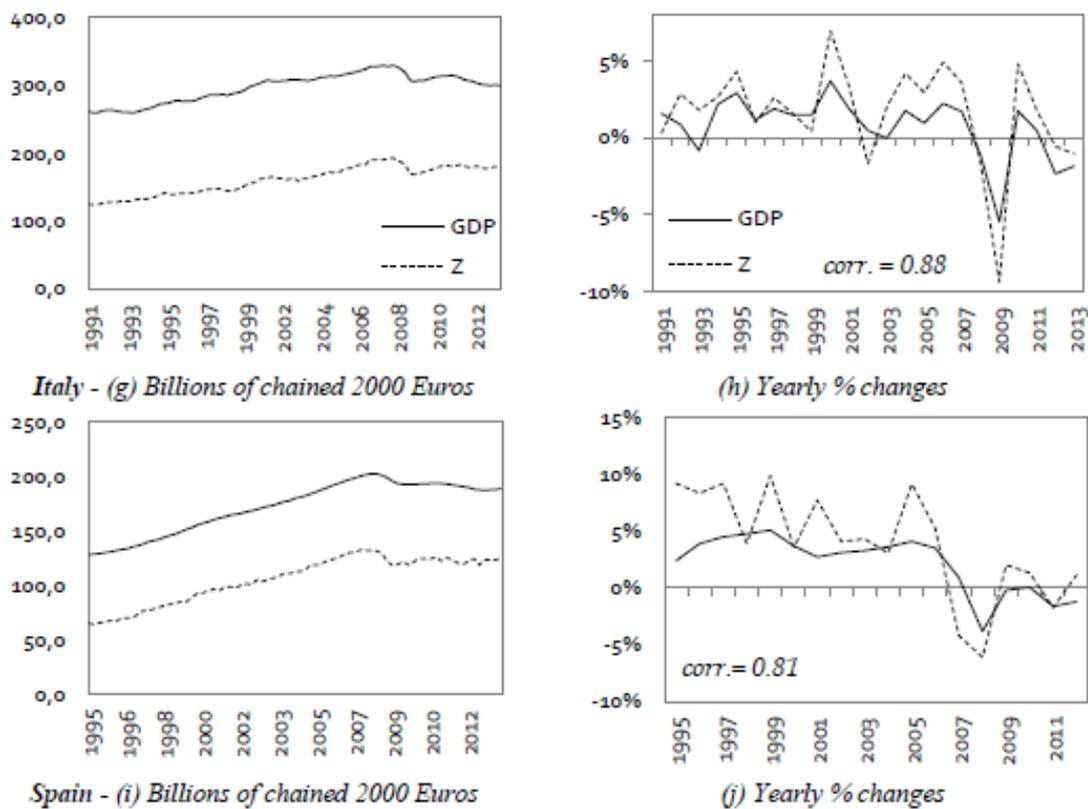


Figure 1b: Autonomous demand (Z) and Gross Domestic Product (GDP) (Italy, 1991-2013; Spain 1995-2013)

Source: Authors' own elaboration on Eurostat Data (see Appendix A)

b.2 The structure and dynamics of autonomous demand

United States - While its overall volume has grown steadily (at least until the mid-2000s), the composition of autonomous demand has changed substantially in time (Figure 2). The share of government spending in GDP and in Z has followed a decreasing pattern, almost perfectly compensated by the rising share of exports. The importance of residential investment has been broadly constant, although with a cyclical pattern, until the early 2000. It then

displayed a relevant increase, reaching a peak in 2005-2006, followed by an even more dramatic reduction.

Overall, after the peak due to military spending in 1950-1953, the share of autonomous demand in GDP has displayed a decreasing trend until 1980, followed by a mild recovery (once again led by military spending) in the first half of the Eighties and by a broad stabilization. Note that net flows of consumer credit (which, as it is useful to recall, does not include mortgages) are modest with respect to the dynamics of autonomous demand. Even during the credit booms of the mid-Eighties and mid-2000s, their size was moderate with respect to the other components of autonomous demand.

European Countries - The overall evolution of the autonomous components of demand is characterized by a generally increasing trend in the Z/GDP ratio, in the European countries in our sample. Export is the fastest growing component, especially in France and Germany. For this last country, the share of autonomous components reaches a record amount of more than 80%, reflecting a huge increase in the openness of its economy. There are other interesting structural differences revealed by Figure 2: in the decade before 2008-2009 residential investment has been a dynamic and important factor in explaining the Spanish performance; France has the most active public sector, in the context of a decreasing (Germany) or stagnating (Italy) weight of Government demand. The Spanish case presents a peculiar pattern: Government expenditures grew significantly, in absolute and relative terms, until the end of 2007, when they entered into a severe slump due to the application of austerity measures.

The increasing trend of the Z/GDP ratio in European countries, which is

the result of GDP growing slower than autonomous demand, can be explained in terms of a decreasing supermultiplier. This factor has dampened the impact on GDP of variations in autonomous demand and it is summarized in Table 1, which shows the discrepancies between the growth rates of Z and GDP and their relation with the respective decreasing trends in the supermultipliers.

	t	g^Y	g^Z	$g^Y - g^Z$	g^{SM}
US	1947-2013	713.4%	706.8%	6.7%	-17%
Germany	1991-2013	32.5%	114.1%	-81.6%	-35.8%
France	1970-2013	152%	269.4%	-117.3%	-28.6%
Italy	1980-2013	48.4%	94.7%	-46.3%	-24.1%
Spain	1980-2013	113.8%	330.7%	-216.9%	-48.5%

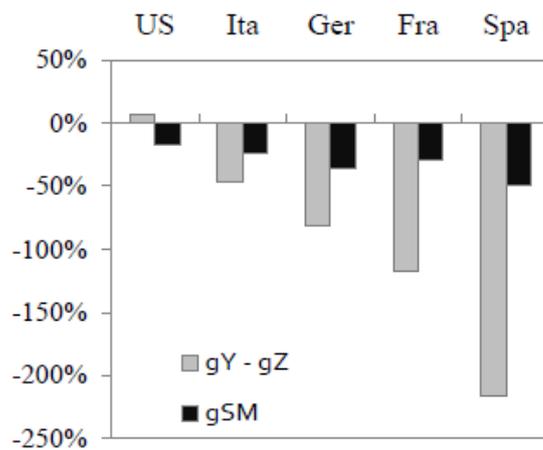


Table 1: Discrepancy between the growth rates of Z and GDP; change in SM

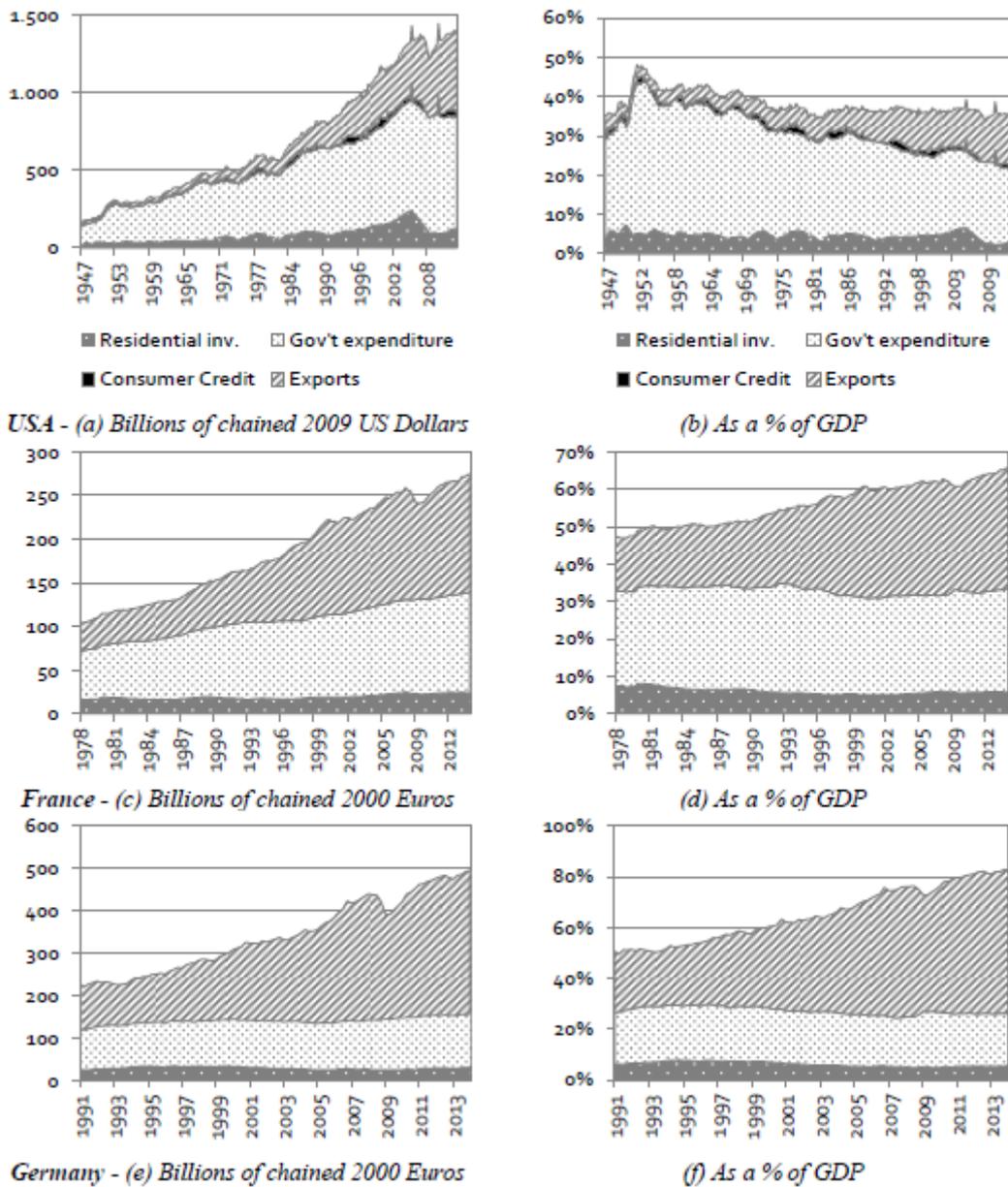


Figure 2a: Autonomous components of aggregate demand
 (Quarterly data; US, 1947-2013; France, 1978-2013; Germany, 1991-2013)
 Source: Authors' own elaboration on various sources (see appendix A)

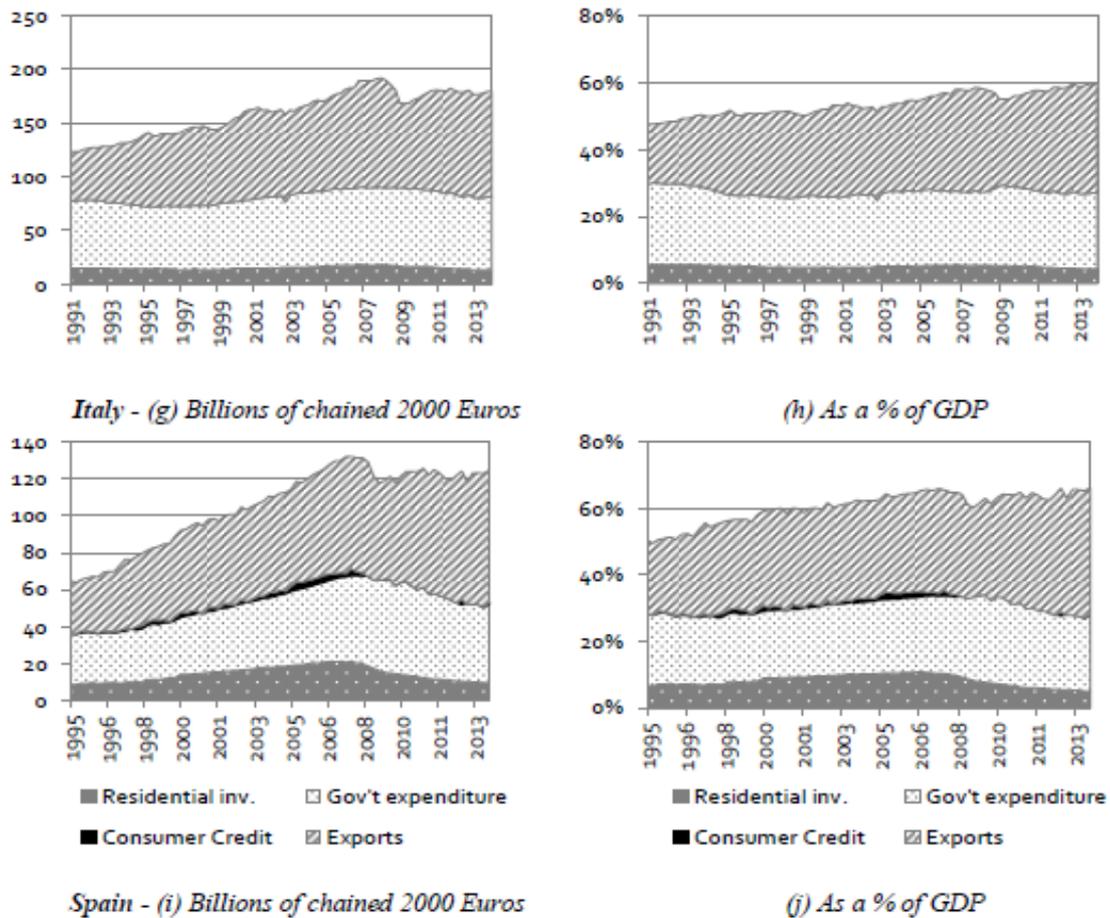


Figure 2b: Autonomous components of aggregate demand
(Quarterly data; Italy, 1991-2013; Spain 1995-2013)

Source: Authors' own elaboration on Eurostat (see appendix A)

Having presented these series, a clarification is in order. Given the magnitudes involved, it may appear of little sense to study the relationship between the total (GDP) and a very big part of it (Z). However, it is important to note that the ratio Z/Y does not correspond to the net contribution of Z to GDP. Part of the autonomous demand measured by Z is devoted to foreign production, as taken into account by the presence of m in the denominator of the supermultiplier. Of course, the fact that the Z/Y ratio is, for example, 80%,

does not mean that 80% of GDP is produced to fulfill autonomous demand.¹⁶

b.3 The supermultiplier

It is interesting to notice that, throughout the all period in which comparable data for the supermultipliers in the five countries of the sample are available, the SM has been clearly higher in the US case (Fig. 3c). This reflects, mainly, lower propensities to import and to save.

United States - The supermultiplier was at an extremely high level in 1947, due to an elevated propensity to consume, most probably because families were eager to spend savings accumulated during the war.¹⁷ As this effect faded away, the propensity to consume and the supermultiplier fell steeply between 1947 and 1951. Since the Sixties, the SM has remained broadly stable. After 1975, its dynamics has been the result of two opposite tendencies: a decreasing propensity to save (at least until 2007-2008) and an increasing propensity to import. The result has been overall stability, with a mildly decreasing trend in the last two decades.

European Countries – A generalized increase in the import share is the main explanatory factor of the decrease in the supermultiplier experienced by the four countries in the years before the outburst of the recent financial crisis.

16 From the accounting identity $Y \equiv C+I+Z-M$, we can see that $Y+M \equiv C+I+Z$, which makes clear that Z is not a net component of GDP.

17 In his speech on the State of the Union, delivered in Jan.1946, President Truman stated that “On the expenditure side (...), consumers budgets, restricted during the war, have increased substantially as a result of the fact that scarce goods are beginning to appear on the market and wartime restraints are disappearing. Thus, consumers’ current savings are decreasing substantially from the extraordinary high wartime rate and some wartime savings are beginning to be used for long-delayed purchases” (Truman, 1946).

For what concerns the German case, the reduction in the supermultiplier has been strengthened by a rising propensity to save, prompted by an improving external balance (Cesaratto, 2013). In France, Italy and Spain the propensities to save have displayed instead a more stable long-run pattern, although with cyclical fluctuations.

It is worth noting the remarkable stability of the propensities to invest, which can be interpreted as a signal of an average degree of utilization close to the normal one.

Table 2 can be seen as an alternative form of ‘growth accounting’ – based on effective demand instead of factors’ supply – and summarizes some major aspects of these historical dynamics, displaying average growth rates of output, autonomous demand and supermultiplier. Changes in Z and SM are decomposed in the contributions of each component.

	Contributions to Z growth						Contributions to SM growth			
	GDP	Z	RES	CC	G	X	SM	s	m	h
United States										
1947-1960	3.7%	4.9%	0.5%	0.0%	4.5%	0.1%	-0.7%	-0.5%	-0.3%	0.0%
1960-1978	4.0%	3.4%	0.6%	0.2%	1.8%	0.6%	0.0%	0.3%	-0.7%	0.5%
1978-1991	2.8%	2.5%	-0.1%	-0.3%	2.0%	1.0%	-0.4%	0.3%	-0.3%	-0.4%
1991-2013	2.6%	2.5%	0.2%	0.0%	0.7%	1.4%	-0.2%	0.5%	-0.9%	0.1%
France										
1978-1991	2.3%	3.0%	0.0%	-	1.6%	1.4%	-0.8%	0.0%	-0.7%	0.0%
1991-2013	1.5%	2.4%	0.0%	-	0.7%	1.7%	-1.0%	-0.1%	-1.1%	0.1%
Germany										
1991-2013	1.3%	3.5%	0.1%	-	0.4%	3.0%	-2.0%	-0.2%	-1.8%	-0.1%
Italy										
1991-2013	0.6%	1.6%	0.0%	-	0.1%	1.7%	-1.0%	-0.1%	-0.8%	-0.2%
Spain										
1995-2013	2.1%	3.8%	0.4%	-0.2%	0.9%	2.5%	-1.4%	-0.1%	-1.4%	0.1%

Table 2: Average annual growth of GDP, Z and SM

notes: contributions may not sum up to the growth rate of the aggregate due to rounding and approximation

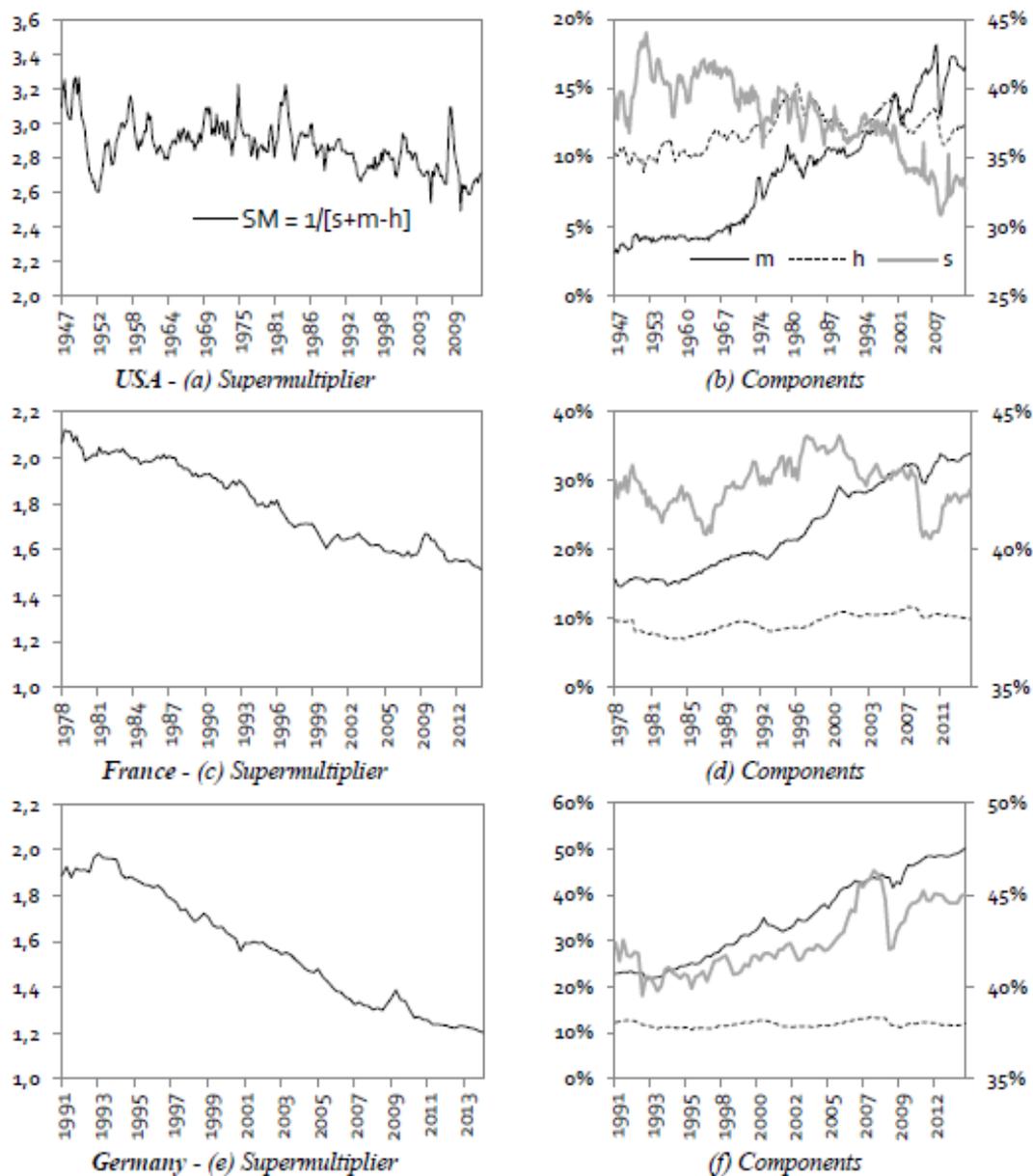


Figure 3a: Supermultiplier (m and h on the left axis, s on the right axis; quarterly data; US, 1947-2013; France, 1978-2013; Germany, 1991-2013)

notes: SM = supermultiplier; m = propensity to import; h = propensity to invest; s = propensity to save;

Source: Authors' own elaboration on various sources (see appendix A)

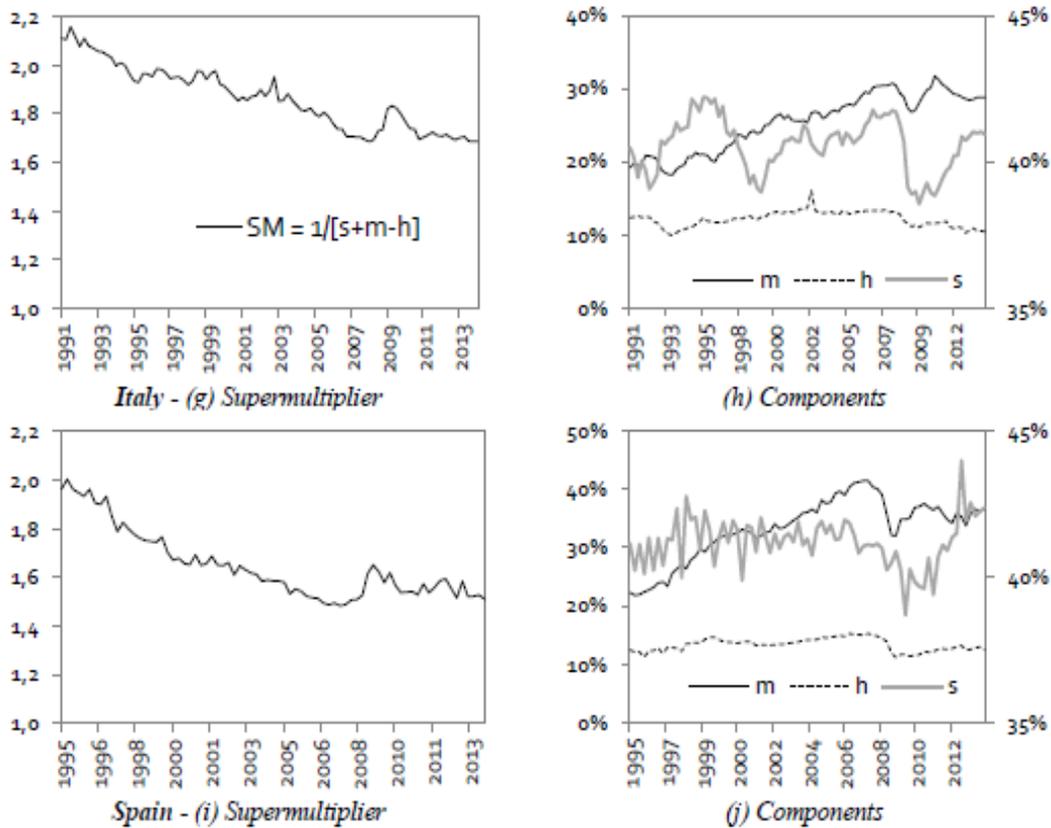


Figure 3b: Supermultiplier (m and h on the left axis, s on the right axis; quarterly data; Italy, 1991-2013; Spain 1995-2013)

notes: SM = supermultiplier; m = propensity to import; h = propensity to invest; s = propensity to save;

Source: Authors' own elaboration on Eurostat data (see appendix A)

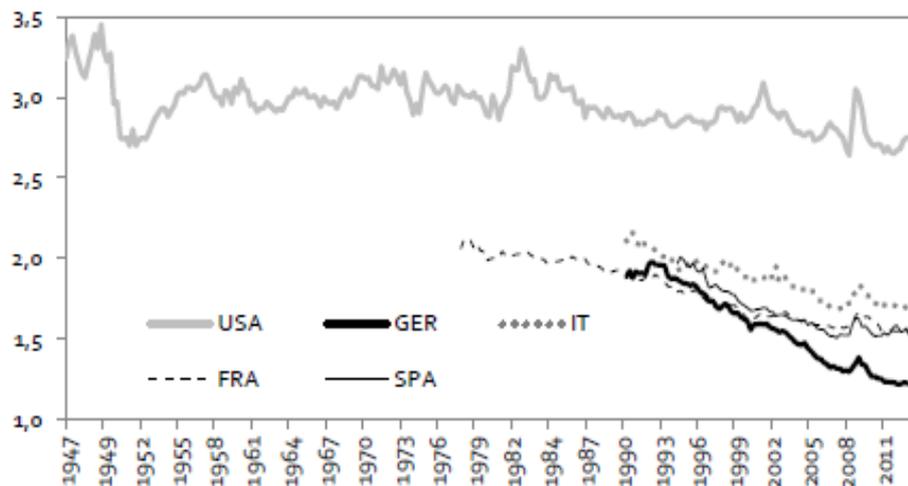


Figure 3c: The supermultiplier

Source: Authors' own calculation and elaboration on various sources

3. Empirical tests

a. Economic growth and autonomous demand across countries and decades

As a first step, we look at the long-run relation between GDP and autonomous demand. We compute (approximately) 10-year¹⁸ average changes in GDP and in autonomous demand in our sample of five countries. We then regress GDP growth rates on percentage changes in autonomous demand. The relation is tight and highly significant. On average, a 1% increase in autonomous demand is associated with a 0.66% increase in GDP. Changes in Z explain 87% of variability in GDP growth (see Fig. 4).

Of course, one must be cautious in interpreting this result in terms of a causal effect of Z on GDP. In fact it is not guaranteed that changes in

¹⁸ Not in all cases the changes are taken exactly over 10-year periods. More specifically, we computed average changes over the following periods: '47-'60, '60-'70, '70-'80, '80-'90, '90-'00, '00-'07, '07-'13 for the US; '90-'00, '00-'07, '07-'13 for Germany, Italy and Spain ('95-'00 for Spain); '78-'90, '90-'00, '00-'07, '07-'13 for France.

autonomous demand are completely exogenous. There could be reverse causality (a positive effect of GDP on autonomous demand), or both changes in output and autonomous demand could be driven by some other factor. Note also that if some component of Z is to some extent counter-cyclical (as may be the case in some instances for government spending and/or exports), this would cause a downwards bias in our estimate of the effect of Z on GDP.

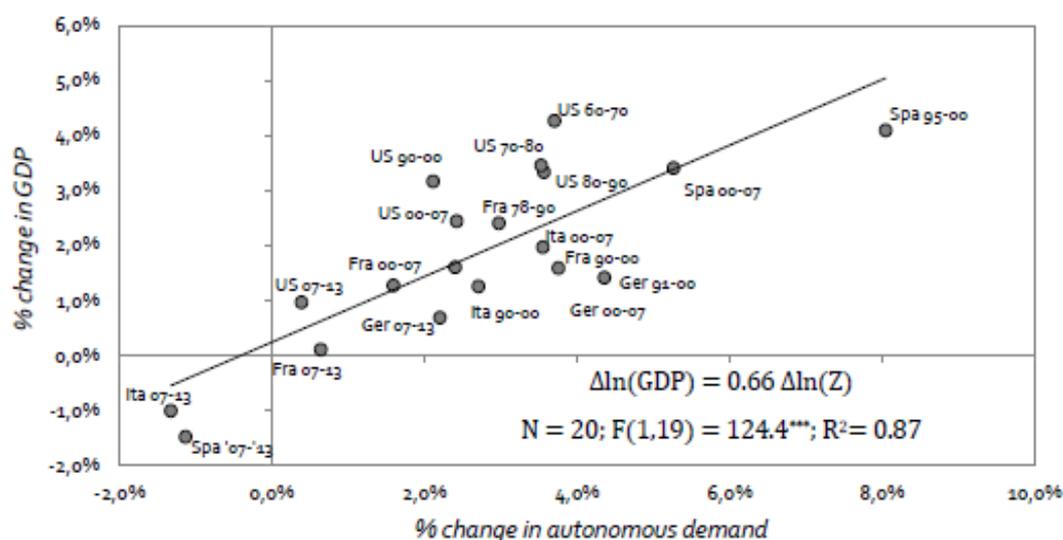


Figure 4: Autonomous demand and GDP across countries and periods (average annual growth rates)

Source: Authors' own elaboration on Eurostat and FRED Database (see Appendix A)

b. Cointegration tests

Cointegration analysis (Engle and Granger, 1987) appears the most natural tool to test more formally H1. In what follows we will assess empirically whether autonomous demand (Z) and output (GDP) share a common long-run trend (i.e., they are cointegrated) in our sample of countries.

The simple theoretical model derived in Section 1 was built under the assumption of constancy of the marginal propensities to save and to import. Nonetheless, the supermultiplier has displayed a strong decreasing trend, in the European countries in our sample, during the whole period under analysis (see Figs. 3), due to an upward trend in the propensity to save (s) and, more importantly, in the propensity to import (m). We thus need to adjust the model, relaxing the mentioned assumption, to appreciate the theoretical implications of these relevant changes. With a time-varying SM, eq. (6) becomes:

$$g^Y = g^Z + g^{SM} + g^Z g^{SM} \quad (11)$$

which implies $g^Y - g^Z = g^{SM} + g^Z g^{SM}$, where g^{SM} is the rate of growth of the supermultiplier. This makes clear that, according to the theory, Y and Z are cointegrated (i.e., $g^Y = g^Z$) only when $g^{SM} = 0$ and that the discrepancy between the trend growth rates of Y and Z is a positive function of the change in SM.¹⁹

In other words, output and autonomous demand move in step as long as the supermultiplier is constant. Otherwise, the impact of variations in Z is amplified or dampened by the change in SM.

Visual inspection of Figure 1 strongly suggest that both GDP and Z are I(1) processes (i.e., they are non-stationary in levels but stationary in first-differences). This is confirmed by ADF unit-root tests (Dickey and Fuller, 1979). On the basis of the above discussion, we expect GDP to be cointegrated with Z for countries and periods in which the supermultiplier (SM) is stable enough.

To test for cointegration, we perform a Johansen cointegration test (Johansen, 1988 and 1991), based on a model with a constant trend and two lags²⁰, on the natural logarithms of Z and GDP. The null hypothesis of no

19 We are ruling out the case in which $g^Z \leq -1$, which makes little economic sense.

20 Inclusion of a constant trend is suggested by visual inspection of the data. In order to select the lag order, we estimated a VAR in levels including Z and GDP and computed several

cointegration is rejected at the 95% confidence level only for the US, while it cannot be rejected at any conventional level for the four European countries. This appears compatible with the predictions of supermultiplier theory. As shown in Figures 3, the supermultiplier was indeed broadly stable in the US (except for some fluctuation in the very beginning of the sample), while it had a neat and strong decreasing trend in the four European countries.

	USA	Germany	France	Italy	Spain
$H_0: \text{rank} = 0$	18.7**	9.9	6.7	6.0	12.3
N	267	91	143	91	75
	1947:Q3-	1991:Q3-	1978:Q3-	1991:Q3-	1995:Q1-
	2014:Q1	2014:Q1	2014:Q1	2014:Q1	2014:Q1

Table 3: Johansen test, trace statistics for the null of no cointegration between Z and GDP

*Notes: 2 lags of each variable and an unrestricted constant included in the underlying VAR model; *, ** and *** denote rejection of the null hypothesis of no cointegration at the 0.10, 0.05 and 0.01 significance levels respectively.*

In order to get a taste of the stability of the cointegration relation found in US data, we plot the residuals from a regression of GDP on Z (Figure 5). The result is not exactly what we would expect from a stable cointegration relation: it appears clear that the relation between Z and GDP underwent a major change

standard information criteria. Schwarz's Bayesian information criterion (BIC), Akaike's information criterion (AIC) and Hannan-Quinn information criterion (HQIC) all point to the inclusion of two lags. As shown by Nielsen (2001), these tests are valid even in the presence of I(1) variables. As a robustness test, we run the Johansen test with any possible number of lags between 1 and 16. In all cases the test rejected the null of no-cointegration at the 0.05 significance level (in most cases also at the 0.01 level).

in the very first years of the sample. In particular, if we accept provisionally the hypothesis that the cointegration relation is due to a long-run causal effect of Z on Y, the pattern of residuals would suggest that the elasticity of Y with respect to Z was much higher in the 1947-1950 period and then decreased substantially. According to theory, this should be the result of the initial reduction in the supermultiplier.

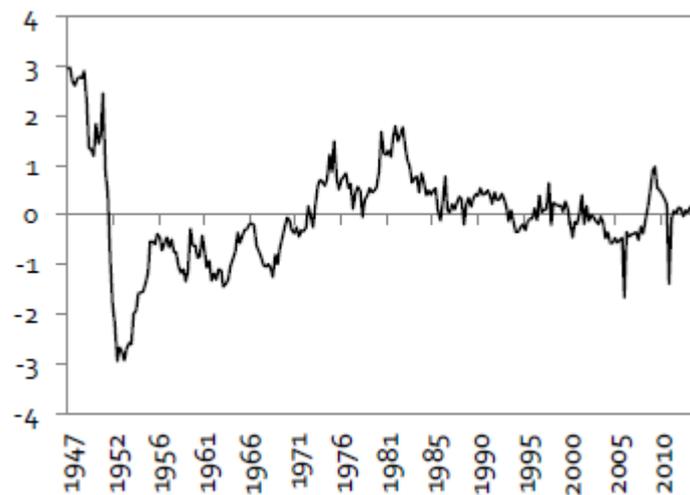


Figure 5: Standardized residuals from a regression of $\ln(\text{GDP})$ on $\ln(Z)$ (US, quarterly data, 1947:Q1 – 2014:Q1)

Summing up, in our sample we have a situation which approximates reasonably well the case of $g^{\text{SM}} = 0$ only in the US in the period after the Fifties. Consistently with theory, only in this case we find a stable long-run relation between Z and GDP. In the European countries, in which SM displays a clear decreasing trend, GDP growth has lagged behind the growth of Z and, as predicted by theory, we observe that the higher the decline in SM, the higher the divergence.

It would be useful to test more formally whether the discrepancies

between the long-run trends of Z and GDP , in the European countries, are actually explained by the declining trend of the SM . The most natural way to do this would be to include SM in the cointegration equation and check whether this yields a stable long-run relation or, alternatively, to correct Z by multiplying it for SM . The problem with these solutions is that they would produce a stable cointegration relation *by definition*. In our data $Y_t \equiv Z_t * SM_t$ holds by construction, due to the fact that we calculated the SM components as ex-post ratios of consumption, investment and imports to GDP .²¹ Of course, when we introduce SM in the cointegration equation in the two ways just mentioned, we obtain a stable cointegration relation in all countries, but the result has no explanatory meaning. One could try to build some proxy for the supermultiplier in order to break the accounting identity (for example employing the household saving rate, corrected for an average taxation rate, instead of the actual overall marginal propensity to save). But the dilemma would not be solved at all: a good proxy for SM is closely correlated with actual SM , so our estimated cointegration relation would remain very close to an accounting identity.

We will thus proceed in the following way: we exploit the period begun in the Sixties, in the US, to study the short-run properties of the cointegrated system, in a context in which the SM can be reasonably assumed to be constant; we then perform, for all the five countries in our sample, a TSLS panel estimation of the short-run effect of Z on output, employing annual data.

21 Changes in inventories, which we did not include in the analysis, and possibly a statistical discrepancy between expenditure side and output side measurement of GDP , prevent our measure of $Z*SM$ to be exactly equal to GDP .

c. Short-run relations and directions of causality

An error-correction model for the US economy - In order to assess short and long-run relations and try to identify the direction of causality, we estimate the parameters of a bivariate Vector Error-Correction Model (VECM), using quarterly data on Z and on GDP for the period 1960:Q1-2014:Q1 in the US.²² We include a constant trend and a two-lags order structure. Assuming a long-run equilibrium relation of the type:²³

$$GDP_t = c + \theta Z_t \quad (12a)$$

we model the short-run adjustment process through the following VECM:

$$\Delta GDP_t = \alpha_0 + \alpha_1(GDP_{t-1} - \theta Z_{t-1} - c + \mu) + \alpha_2 \Delta GDP_{t-1} + \alpha_3 \Delta Z_{t-1} + e_{1t} \quad (12b)$$

$$\Delta Z_t = \gamma_0 + \gamma_1(GDP_{t-1} - \theta Z_{t-1} - c + \mu) + \gamma_2 \Delta Z_{t-1} + \gamma_3 \Delta GDP_{t-1} + e_{2t} \quad (12c)$$

where Z is the log of real autonomous demand and GDP is the log of real GDP. Supermultiplier theory implies that, *given the stability of the SM*, we should have the following:

- a) $\varepsilon_t = GDP_t - \theta Z_t - c$ is a stationary series
- b) $\theta = 1$
- c) $\alpha_1 < 0$
- d) $\gamma_1 = 0$
- e) $\alpha_3 > 0$

Condition (a) ensures that autonomous demand and output share the same long-run trend. We have already verified that through the Johansen cointegration test. Condition (b) means that Z and GDP move in step in the

²² As discussed in the previous subsection, we restrict the analysis to the period during which the supermultiplier was broadly stable (see Fig. 3a, panel a).

²³ One obtains eq. 12a by normalizing the cointegrating vector with respect to GDP_t .

long-run. The most important restrictions are (c) and (d): taken together, they imply that long-run causality goes from Z to GDP and not vice versa. Finally, (e) means that autonomous demand has a positive short-run multiplier effect.

Results are presented in Table 4, columns (1). The estimated long-run coefficient θ is very close to one (1.04). The error-correction term is negative and significant at the 95% confidence level in the equation explaining ΔGDP , but it is also positive and significant (but only at the 90% c.l.) in the equation explaining ΔZ . For what concerns short-period coefficients, ΔZ_{t-1} has a positive but low effect on ΔGDP , while the impact of lagged output changes on Z appears much stronger. We have reasons to believe that consumer credit may be the element which is most influenced by the economic cycle (see the discussion below). We thus try to re-estimate our VECM by subtracting this component from Z. Results – reported in table 4, columns (2) – appear much more in line with the hypotheses implied by Supermultiplier theory. The error-correction term is negative and significant in the equation explaining ΔGDP , while in the equation for ΔZ it is not significant: when GDP and Z are in disequilibrium, it is GDP that adapts to the equilibrium relation. This result - coupled with the fact that R^2 is much higher for eq. 12b than for 12c - is supportive of H1 stated above: it appears that autonomous demand drives output in the long-run. The short-run impact of Z on output becomes clearly higher, while the sensitivity of autonomous demand to short-run changes in output strongly decreases, from 0.7 to 0.3. However, also after excluding consumer credit from Z, the effect of output changes on autonomous demand remains highly significant, suggesting that also the other components of Z are somehow influenced by GDP. Feedback effects from output to Z could come from several sources, which we will discuss extensively later.

	Long-run cointegrating eq.		Short-run eq. for ΔGDP_t		Short-run eq. for Δz_t			
	(1) Incl. CC	(2) Excl. CC	(1) Incl. CC	(2) Excl. CC	(1) Incl. CC	(2) Excl. CC		
c	0.75	1.8	α_0	$5.5 \cdot 10^{-3}***$	$-6.5 \cdot 10^{-4}$	γ_0	$2.9 \cdot 10^{-3}$	$2.0 \cdot 10^{-3}$
	-	-		(7.5)	(-0.29)		(1.63)	(0.69)
θ	1.04***	0.93***	α_1	-0.03**	-0.02***	γ_1	0.05*	$-5.5 \cdot 10^{-3}$
	(43.2)	(13.8)		(-2.21)	(-2.56)		(1.68)	(-0.65)
			α_2	0.21***	0.18**	γ_2	-0.24***	0.11
				(2.80)	(2.24)		(-3.13)	(1.40)
			α_3	0.07**	0.17***	γ_3	0.71***	0.27***
				(2.34)	(2.68)		(3.91)	2.67
			R^2	0.53	0.54	R^2	0.18	0.36

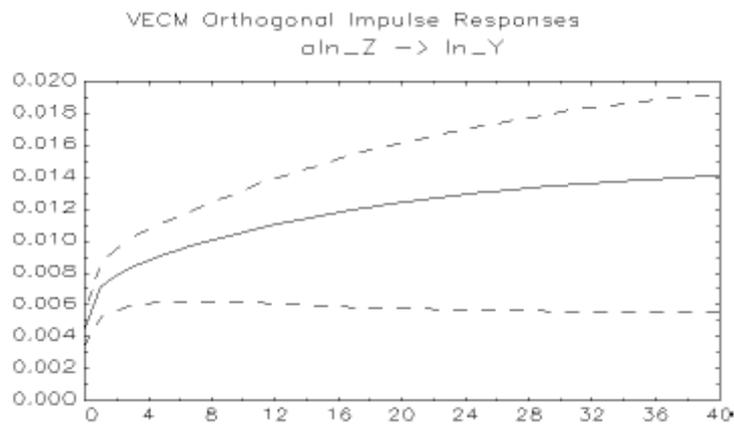
Table 4: Cointegration analysis, relation between Z and GDP. Estimation of the VECM in equations 12a – 12c (US, 1960:Q1-2014:Q1)

Notes: All variables taken in natural logarithms; *t* statistics in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

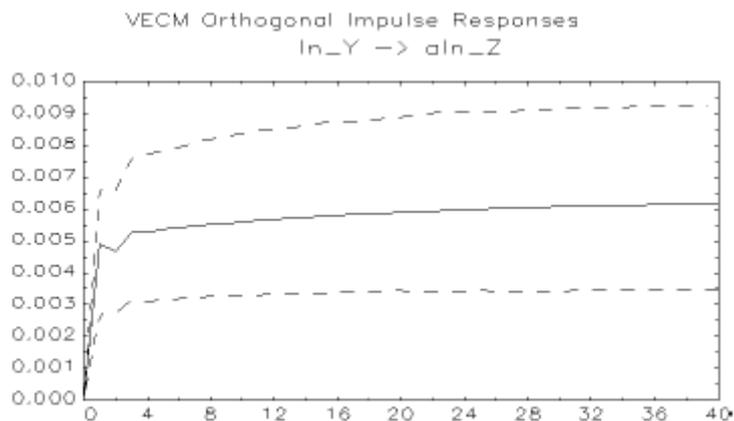
We can appreciate the dynamics of the estimated model by calculating orthogonalized impulse-response functions (IRFs).²⁴ A positive shock to

²⁴ In order to obtain the OIRF we had to impose an identification restriction to the underlying structural model. We choose to employ a Cholesky decomposition, assuming that Z is 'causally prior' to GDP. That means that GDP growth can be affected by contemporaneous and lagged autonomous changes in Z, while Z can be affected by lagged autonomous changes in GDP, but not by contemporaneous ones. This restriction appears the most sensible one: changes in Z are bound to have a contemporaneous effect on output growth, since Z shares some components with GDP. To the contrary, Z is composed by autonomous variables that are discretionary determined by individuals and institutions. When choices influencing Z are made (government budget choices, house purchases, foreign citizens' spending, etc.) the individuals and institutions involved can possibly observe estimates of growth in the preceding quarters, but they cannot observe unexpected changes in GDP that will happen in the same quarter

autonomous demand has a permanent but low effect on output (panel a). At the same time, an increase in output has a positive and persistent, but even lower, effect on autonomous demand (panel b).



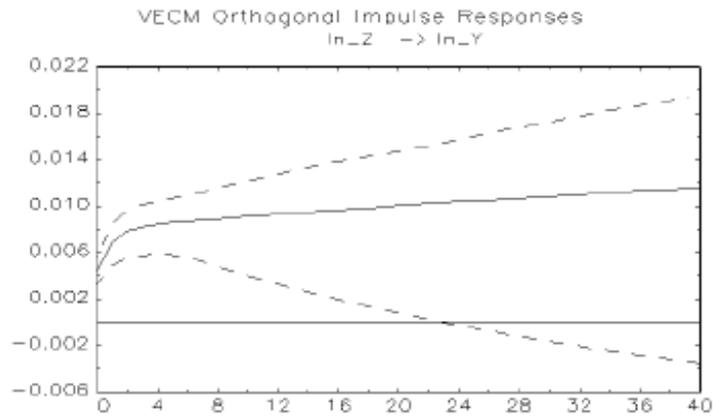
(a)



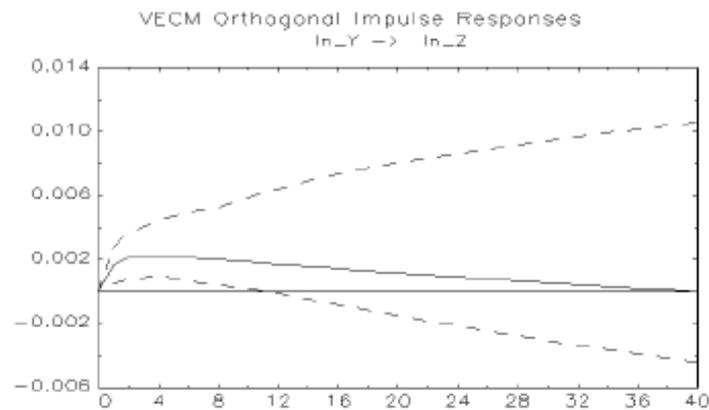
(b)

Figure 6: Orthogonalized impulse response functions (OIRFs) and bootstrapped 90% confidence intervals (US, quarterly data, 1960:Q1-2014:Q1)

Unsurprisingly, the picture changes after excluding consumer credit from Z (Figure 7). The main difference is that the impact of output on Z becomes much smaller and tends to fade away with time.



(a)



(b)

Figure 7: Orthogonalized impulse response functions (OIRFs) and bootstrapped 90% confidence intervals (US, quarterly data, 1960:Q1-2014:Q1, CC excluded from Z)

It emerges clearly from our tests the presence of a mutual influence

between autonomous demand and output. In spite of having classified Z as the autonomous components of demand, by definition independent from the actual or expected level of aggregate demand and output, the empirical evidence shows that causality runs not only from Z to Y, as expected, but also from Y to Z. It has to be specified that, in the Sraffian-Keynesian growth model presented, the fact that Z is autonomous means that it is not determined by output through a necessary functional relation. Even so, Z does not fall from the sky: it is socially and historically determined and, among the various social and economic factors that influence autonomous spending, there can also be the level and the growth of output. There are indeed several plausible explanations for this mutual influence.

There are solid theoretical reasons to expect a strong endogeneity of consumer credit. The evolution of output is likely to influence both demand and supply for credit. If we imagine for example a period of economic bonanza, following Minsky (Minsky, 1982), it is plausible to expect a loosening of the conditions at which credit is conceded. Lenders' appetite for risk of is pro-cyclical, and the same can be maintained for borrowers'.

On the side of demand, it is possible to refer also to the seminal Veblen's contribution (Veblen, 1975 [1899]) to argue that an increase in the income accruing to the richest fraction of the population (and in their consumption) is likely to stimulate a desire of emulation in the other segments, which triggers new demand for credit to afford a level of consumption above the economic possibilities of the borrowers.²⁵

For what concerns exports, following the contribution of Dixon and Thirlwall (1975), it can be argued that the (demand-led) growth of output in a

25 For a recent formalization of emulation-driven consumption, see for example Kim, Setterfield and Mei (2014).

country has positive effects on its productivity, through the working of the Verdoorn's law (Verdoorn, 1949), increasing in this way the external competitiveness of the country and stimulating its exports. Moreover, in the case of the US economy, which can be considered one of the main engines of worldwide demand, increases in its income growth may have positive spillovers on trade partners, boosting their income and their demand for imports from the US. A similar reasoning can be thought to be at work for Germany, in the context of the highly integrated European economy.

Regarding the behavior of public expenditure, various authors and the same international institutions (OECD, 2003; European Commission, 2004; Turrini, 2008, Landmann, 2014) have noticed its pro-cyclical stance, especially in Europe. A period of GDP growth, generating higher tax revenues, may allow more sustained public expenditures when the government has set some target for the public deficit (or surplus). Besides, the years after the Great Recession have seen the actuation of policies marked by austerity measures, dictating severe reductions in G to restore public finances' health, in the presence of negative trends in GDP (Jordà and Taylor, 2013). This does not imply that fiscal policy is not discretionary, even when governments follow peculiar fiscal rules (themselves completely discretionary too), but means that the path of public expenditure, even if autonomous, is not abstract from reality and necessarily responds to the economic and political context and objectives of a country.

A last possible channel of influence has to do with the specific proxy we used for one of the components of autonomous consumption, namely residential investment, which tends to be positively affected by GDP growth (Arestis and González-Martínez, 2014).

Instrumental Variables estimation - Since GDP and Z are not cointegrated, in our sample period, in the four European economies, we have not been able in the previous analysis to study the short-run causal relation between these two variables. The most straightforward way to assess the short-run effect of autonomous demand on output would be to estimate an equation of the type:

$$\Delta \text{GDP}_{c,t} = \mu_c + \sum_{i=1}^m \alpha_i \Delta \text{GDP}_{c,t-i} + \sum_{j=0}^n \beta_j \Delta Z_{c,t-j} + \varepsilon_{c,t} \quad (13)$$

where c indicates the country and μ_c are country-specific fixed effects.

However, the β_s estimated from this specification would suffer from endogeneity. Indeed, when studying the US case, we found strong mutual causality in the short-run between Z and GDP. Moreover, it is widely acknowledged in the empirical literature on fiscal multipliers (see for example Ramey, 2011; Nakamura and Steinsson, 2014) that Government spending, a major component of autonomous demand, tends to react to the economic cycle.

To tackle endogeneity, we estimate eq. (13) through two-stages least squares (TSLS). We include observations from all five countries in our sample using annual data²⁶ and set $m = n = 2$.²⁷ As instrumental variables for Z we employ military expenditure, US economic growth (for European countries) and an index²⁸ which measures trade restrictions imposed by Mexico and Canada (for the US).²⁹ These are important determinants of exports and government spending (the two major components of Z), which are plausibly exogenous with respect to a country's economic cycle.

26 We were able to find time-series of our instrumental variables only at this frequency.

27 We choose the lag-length on the basis of conventional tests, inspection of correlation and autocorrelation functions and statistical significance.

28 In particular we used a component of the KOF Index of Globalization (Dreher, Gaston and Martens, 2008). See Appendix A.

29 We have considered also several other possible instruments, like for example population growth, economic costs of natural disasters, households' debt stock and the IMF narrative index of deficit-driven fiscal consolidations (Guajardo, Leigh and Pescatori, 2011) but they resulted endogenous and/or not-relevant.

Military expenditure is widely used as instrument for G in the empirical literature (e.g. Nakamura and Steinsson, 2014), since it is largely unrelated to short-run output fluctuations. US growth is surely an important exogenous determinant of demand for European exports, under the plausible assumption that, in the short-term, the dynamics of US output is not determined by the growth rate of European economies. Conversely, we do not employ European growth as an instrument for US autonomous demand because the US economy is likely to exert a considerable influence on it (so the instrument would not be exogenous). Instead, we employ an index of trade restrictions imposed by Mexico and Canada, by far the two most important destinations of US exports.

The first stage of the estimation indicates that our instruments are relevant. The F-statistic on the excluded instruments and the Anderson canonical correlation test are highly significant (with $p < 0.00001$ in both cases) and the partial R^2 of the first-stage regression is 22%. Sargan (1958) and Basmann (1960) tests of overidentifying restrictions suggest that the instruments are also valid (i.e., exogenous).

We find α_1 and β_0 to be statistically significant at the 1% confidence level, while α_2 , β_1 and β_2 are not significantly different from zero at any conventional level. Country-specific effects are jointly significant. We employ estimation results to track the short-run effect of a unit increase in Z (i.e., the multiplier of Z). The impact multiplier is 1.1. The cumulative 4-year multiplier is 1.4. In other words, a one-Dollar (or Euro) increase in autonomous demand raises output by 1.1 dollars over the first year and by 1.4 dollars over four years³⁰(Figure 8).

As robustness tests, we re-estimate eq. 13 using a pooled TSLS estimator

³⁰ Impulse responses (IRs) calculated from the estimated model can be interpreted as elasticities (given that we take variables in natural logarithms), so the multiplier at a given time horizon is simply the IR divided by the ratio Z/Y . For the definitions of n-year multiplier and cumulative multiplier see Spilimbergo et al. (2009).

(which excludes fixed-effects) and a random-effects (RE) TSLS estimator. Results remain qualitatively analogous to those produced by the within-groups estimator: in both cases the impact multiplier decreases slightly to 0.9 but the 4-years cumulated multiplier mildly increases to 1.6.

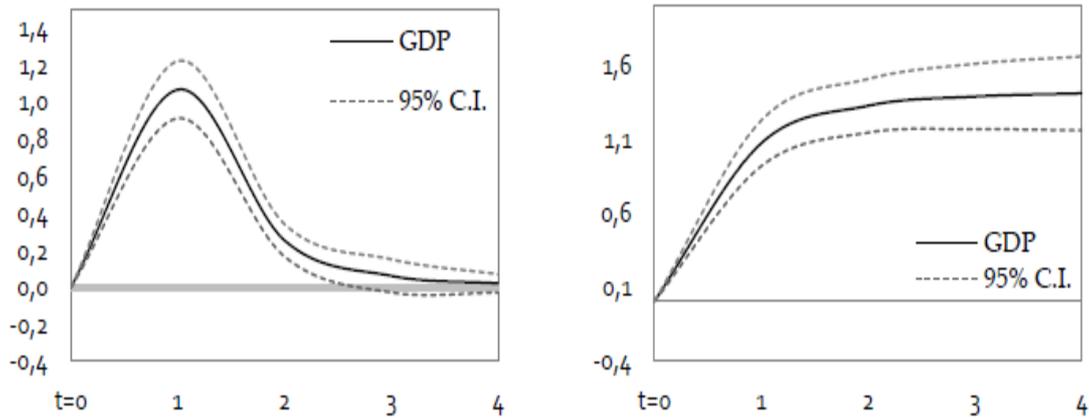


Figure 8: Short-run multiplier of Z (TSLS estimation, yearly data, all five countries)

d. Autonomous demand and the investment share

Let us now assess whether increases in the rate of growth of autonomous demand tend to cause increases in the investment share (hypothesis H3), as Supermultiplier theory would predict. Figure 9 displays the relation between lagged changes in Z and changes in the investment share in our sample of countries, highlighting a positive relation, which suggests that indeed the rate of change of I/Y is positive function of g^Z .

In order to test H3 more formally, we perform Granger causality tests.³¹

³¹ Granger causality test is useful in identifying lead-and-lag relationships between time-series. The variable X causes the variable Y, in the sense of Granger, if past values of X

For each country, we employ Ordinary Least Squares (OLS) to estimate the parameters of the following equations:

$$\Delta I_t = \alpha_0 + \sum_{i=1}^n \alpha_i (\Delta I)_{t-i} + \sum_{j=1}^n \beta_j (\Delta Z)_{t-j} + \varepsilon_{It} \quad (14a)$$

$$\Delta Z_t = \gamma_0 + \sum_{i=1}^n \gamma_i (\Delta Z)_{t-i} + \sum_{j=1}^n \delta_j (\Delta I)_{t-j} + \varepsilon_{Zt} \quad (14b)$$

where I is the log of the investment share (I/GDP*100) and Z is the log of autonomous demand, with the order of lags (n = 2) selected by the usual criteria. We can then calculate F-statistics testing the null hypotheses of non Granger-causality, which are respectively:

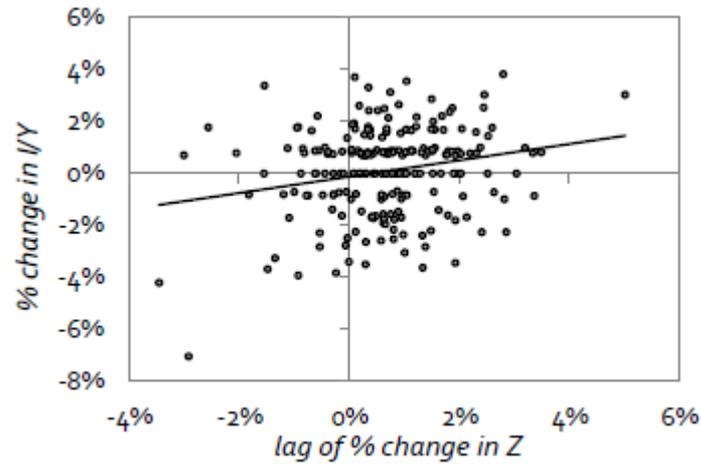
$$H_0: \beta_1 = \beta_2 = 0 \text{ and } H_0: \delta_1 = \delta_2 = 0$$

Results (Table 5) confirm the indications of Figs. 9. A speeding up in the growth of Z do tend to be followed by an acceleration in the dynamic of the investment share, as predicted by Supermultiplier Theory. First-lagged autonomous demand is positively and significantly related to the investment share in all five countries, while the second lag is negative but much lower in absolute value. The null that Z does not Granger-cause I is rejected for all European countries at the 95% confidence level, while for the US it is rejected when the sample is restricted to the after-1960 period (in the whole sample the p-value is 0.15).

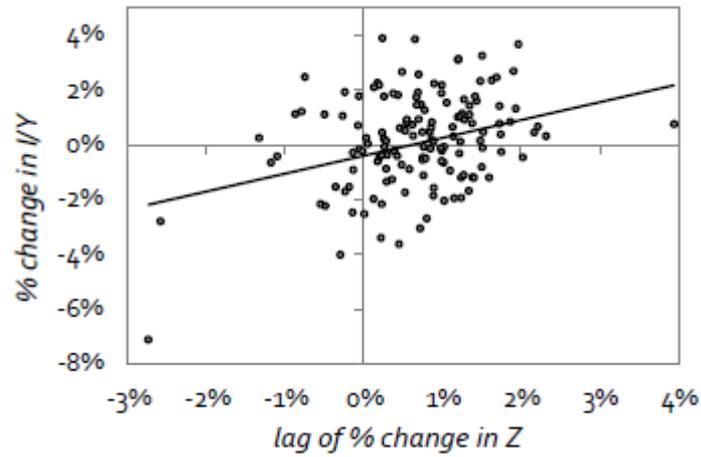
Is there some feedback effect of the investment share on autonomous demand? We would expect so, given that investment exerts a multiplier effect on output, and in turn the latter has been found in previous tests to positively affect autonomous demand. However the investment share Granger-causes autonomous demand with a positive (but rather low) coefficient in the cases of France and Italy but not in the other countries (also in the case of the US in the

contain useful information to predict the present value of Y. Formally, X Granger-causes Y if $E(y_t | y_{t-1}, y_{t-2}, \dots, x_{t-1}, x_{t-2}, \dots) \neq E(y_t | y_{t-1}, y_{t-2}, \dots)$.

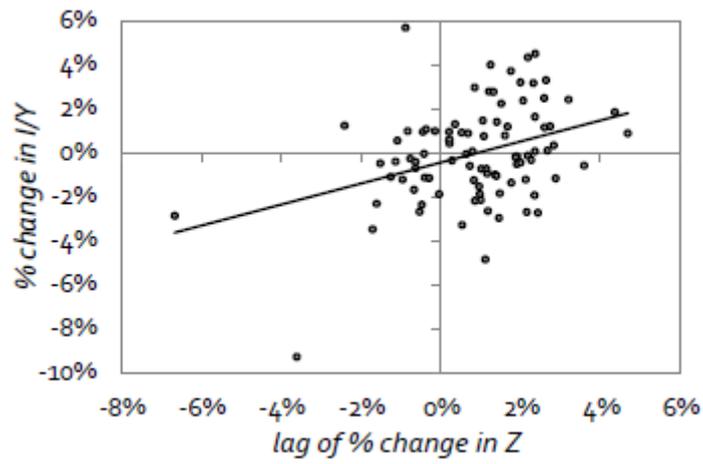
whole sample I appears to Granger-cause Z, however the estimated coefficient is *negative*).



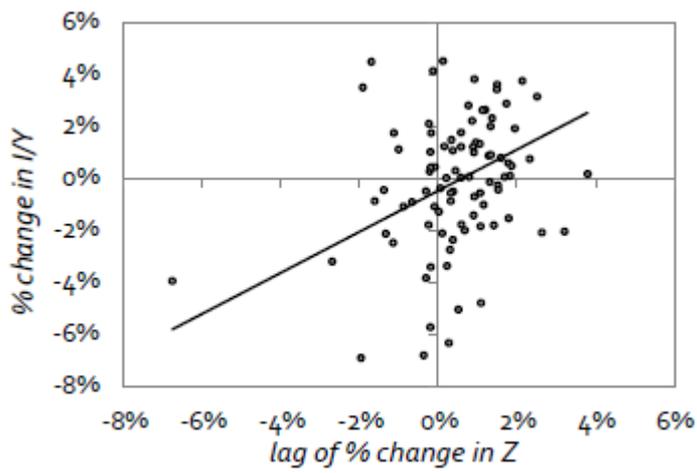
(a) USA (1947:Q3-2014:Q1)



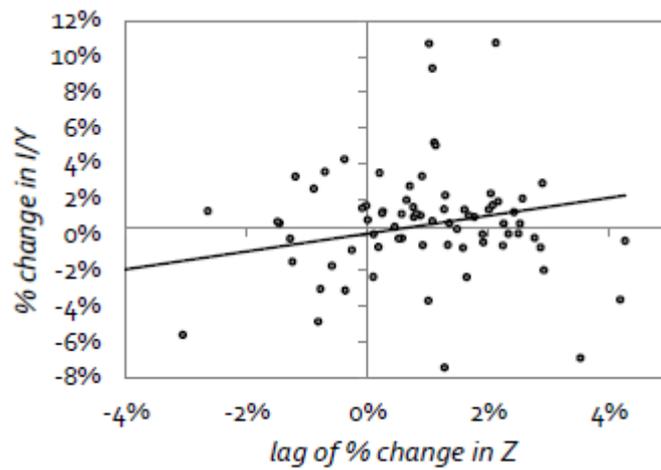
(b) France (1978:Q3-2014:Q1)



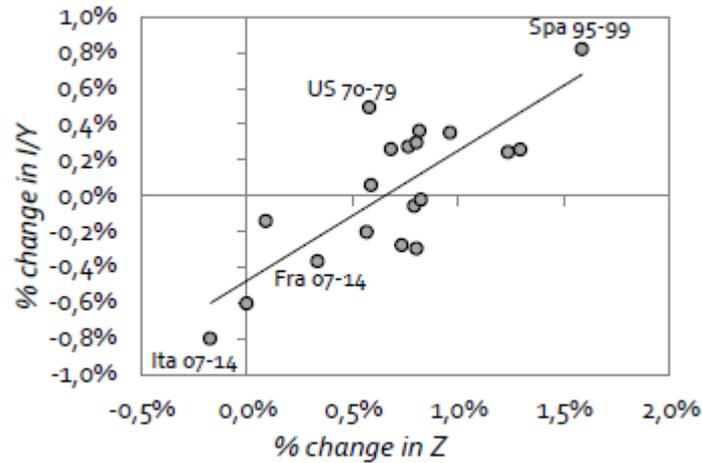
(c) Germany (1991:Q3-2014:Q1)



(d) Italy (1991:Q3-2014:Q1)



(e) Spain (1995:Q3-2014:Q1)



(f) Across countries and periods³²

Figure 9: Relation between the investment share and lagged autonomous demand (quarterly % changes)

Table 5: Granger causality test between autonomous demand and the investment share (eqs. 14a – 14b)

Notes: All variables taken in natural logarithms. ; *t* statistics in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

³² We computed average changes over the following periods: '60-'69, '70-'79, '80-'89, '90-'99. '00-'06, '07-'14 for the US; '91-'99, '00-'06, '07-'14 for Germany, Italy and Spain ('95-'99 for Spain); '78-'89, '90-'99, '00-'06, '07-'14 for France.

		US	US°	Germany	France	Italy	Spain
(eq. s1)		<i>Dependent variable: change in investment share (ΔI)</i>					
α_0	const.	-1·10 ⁻³ (-0.71)	-2·10 ^{-3*} (-1.97)	-8·10 ^{-3***} (-3.01)	-5·10 ^{-3*} (-1.85)	-0.01* (-1.97)	-8·10 ⁻³ (-1.65)
α_1	ΔI_{t-1}	0.37*** (5.02)	0.55*** (7.80)	-0.16 (-0.94)	0.16 (1.41)	-0.26* (-1.73)	-0.18 (-1.04)
α_2	ΔI_{t-2}	-0.14** (-2.20)	-0.30*** (-4.69)	-0.10 (-0.95)	-0.09 (-1.06)	0.09 (0.87)	0.02 (0.19)
β_1	ΔZ_{t-1}	0.19* (1.93)	0.42*** (3.74)	0.89*** (4.30)	0.75*** (2.66)	1.21*** (3.73)	1.01*** (2.92)
β_2	ΔZ_{t-2}	-0.06 (-0.73)	-0.13 (-1.45)	-0.28* (-1.86)	-0.18 (-0.77)	-0.50* (-1.74)	-0.50* (-1.77)
$F_{2,85}$ ($H_0: \beta_1=\beta_2=0$)		1.93	7.85***	10.7***	4.05**	7.08***	4.26**
R^2		0.11	0.28	0.25	0.08	0.16	0.12
<i>Adj. R²</i>		0.09	0.27	0.21	0.05	0.12	0.07
(eq. s2)		<i>Dependent variable: change in autonomous demand (ΔZ)</i>					
γ_0	const.	4·10 ^{-3***} (4.30)	5·10 ^{-3***} (5.40)	6·10 ^{-3**} (2.61)	5·10 ^{-3***} (4.60)	3·10 ^{-3**} (2.15)	0.01*** (2.89)
γ_1	ΔZ_{t-1}	0.47*** (6.90)	0.22** (2.43)	0.30* (1.86)	0.34*** (3.34)	0.293** (2.34)	0.27* (1.73)
γ_2	ΔZ_{t-2}	-0.13** (-2.12)	-0.05 (-0.70)	-0.03 (-0.25)	-0.14 (-1.60)	2·10 ⁻³ (0.02)	4·10 ⁻³ (0.03)
δ_1	ΔI_{t-1}	-0.12** (-2.37)	-0.09 (-1.53)	4·10 ⁻³ (0.03)	0.10** (2.56)	0.15** (2.57)	0.04 (0.55)
δ_2	ΔI_{t-2}	0.04 (0.86)	0.07 (1.38)	-0.04 (-0.39)	-0.04 (-1.17)	-0.01 (-0.34)	-0.02 (-0.32)
$F_{2,85}$ ($H_0: \delta_1=\delta_2=0$)		3.07**	1.39	0.15	3.53**	5.43***	0.16
R^2		0.18	0.05	0.08	0.14	0.18	0.09
<i>Adj. R²</i>		0.17	0.03	0.04	0.11	0.15	0.03
N		266 1947:Q1- 2014:Q1	217 1960:Q1- 2014:Q1	90 1991:Q3- 2014:Q1	142 1978:Q3- 2014:Q1	90 1991:Q3- 2014:Q1	74 1995:Q3- 2014:Q1

Conclusions

In the present paper we have attempted a first empirical test of the Sraffian-Supermultiplier model. We have calculated time-series of the autonomous components of aggregate demand and of the supermultiplier for the US, France, Germany, Italy and Spain and described their patterns in recent decades: the whole after-WWII period for the US; 1978-2013 for France; 1991-2013 for Germany and Italy; 1995-2013 for Spain. We have then performed econometric tests of some major implications of the Supermultiplier theory.

Our qualitative analysis has highlighted that growth rates of autonomous demand and output are tightly correlated, both in the short and in the long-run. Furthermore, the supermultiplier has been much higher in the US than in the other countries in the whole observable period. In the four European countries, a rise in the import share, fueled also by the process of European integration, has caused a continuous decline in the supermultiplier in our sample period. To the contrary, the supermultiplier has been broadly stable in the US since the Sixties, as a result of a decreasing propensity to save, which has compensated an increasing propensity to import.

For this reason the US represent an ideal scenario for a cointegration analysis, in order to study the long and short-run relations between autonomous demand and output in the presence of a generally stable supermultiplier. In this case, we have found output and autonomous demand to be cointegrated, i.e., to share a common long-run trend. From the estimation of a Vector Error Correction Model (VECM), we found evidence of short-run simultaneous causality between autonomous demand and economic growth. We have argued that this is compatible with theory and we have proposed a

series of complementary explanations, all based on the idea that autonomous demand is socially and historically determined.

We have not found cointegration between output and autonomous demand in the four European countries under analysis. As we have showed formally, this can be explained by the theory, given the strongly decreasing trend of the supermultiplier these countries have experimented. As suggested by the model, the magnitude of the discrepancy between the trend growth rates of GDP and autonomous demand appears directly related to the variation in the supermultiplier.

In order to tackle endogeneity problems, we performed a TSLS panel estimation of the short-run effect of Z on output, employing annual data. We found an impact-multiplier of 1.10 and a 4-years cumulative multiplier of 1.41. As instruments for Z, we utilized military spending, US growth (for the European countries) and an index of trade restrictions imposed by Canada and Mexico (for the US).

A further implication of the model that we tested against empirical evidence is that accelerations in autonomous demand growth tend to be followed by increases in the investment share. Through Granger-causality tests, we have found that this is the case in all five countries.

To our knowledge, this is the first systematic and multi-country empirical test of Supermultiplier model. It is fair to recognize the limitations of our analysis, in particular the limited time-span analyzed (especially for European countries), the exclusion of consumer credit from Z (due to data availability) for three countries and the oversimplified nature of the estimated model.

Results cannot of course be taken as conclusive, but just as a first step.

Further studies will be necessary, especially if they will find ways to deal with two main findings of our work: the non-stationarity of the supermultiplier and the mutual influence between output and autonomous demand, which makes it difficult to infer causality.

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Appendix A: Dataset and sources

A1. United States

GDP - US Bureau of Economic Analysis, *Real Gross Domestic Product, 3 Decimal* [GDPC96], retrieved from FRED, Federal Reserve Bank of St. Louis <https://research.stlouisfed.org/fred2/series/GDPC96/>

Exports (X) – US Bureau of Economic Analysis, *Real Exports of Goods & Services, 3 Decimal* [EXPGSC96], retrieved from FRED, Federal Reserve Bank of St. Louis <https://research.stlouisfed.org/fred2/series/EXPGSC96/>

Government spending (G) - US Bureau of Economic Analysis, *Real Government Consumption Expenditures & Gross Investment* [GCEC96], retrieved from FRED, Federal Reserve Bank of St. Louis <https://research.stlouisfed.org/fred2/series/GCEC96/>

Residential Investment (RES) - US Bureau of Economic Analysis, *Shares of gross domestic product: Gross private domestic investment: Fixed investment: Residential* [A011RE1Q156NBEA], retrieved from FRED, Federal Reserve Bank of St. Louis <https://research.stlouisfed.org/fred2/series/A011RE1Q156NBEA/>

Consumer credit (CC) - Board of Governors of the Federal Reserve System (US), *Total Consumer Credit Owned and Securitized, Outstanding* [TOTALSL], retrieved from FRED, Federal Reserve Bank of St. Louis <https://research.stlouisfed.org/fred2/series/TOTALSL/>

Private non-residential investment (I) - US Bureau of Economic Analysis, *Shares of gross domestic product: Gross private domestic investment: Fixed investment: Nonresidential* [A008RE1Q156NBEA], retrieved from FRED, Federal Reserve Bank of St. Louis <https://research.stlouisfed.org/fred2/series/A008RE1Q156NBEA/>

Consumption (C) - US Bureau of Economic Analysis, *Real Personal Consumption Expenditures* [PCECC96], retrieved from FRED, Federal Reserve Bank of St. Louis <https://research.stlouisfed.org/fred2/series/PCECC96/>

Imports (M) - US Bureau of Economic Analysis, *Imports of Goods & Services* [IMPGS], retrieved from FRED, Federal Reserve Bank of St. Louis <https://research.stlouisfed.org/fred2/series/IMPGS/>

Military spending – SIPRI military expenditure database http://www.sipri.org/research/armaments/milex/milex_database

Index of trade restrictions (Mexico and Canada) – KOF index of globalization 2014, component aii. <http://globalization.kof.ethz.ch/>

A2. European countries

GDP – Eurostat Quarterly National Accounts, *Gross Domestic Product at market prices*, retrieved from Eurostat http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=namq_gdp_k&lang=en

Exports (X) - Eurostat Quarterly National Accounts, *Exports of goods and services*, retrieved from Eurostat http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=namq_gdp_k&lang=en

Government spending (G) – Eurostat Quarterly National Accounts and

Eurostat Quarterly Government Finance Statistics, *Final Consumption Expenditure of General Government + General Government Gross Fixed Capital Formation*, retrieved from Eurostat http://appsso.eurostat.ec.europa.eu/nui/show.dodataset=namq_gdp_k&lang=en and http://appsso.eurostat.ec.europa.eu/nui/show.dodataset=gov_10q_ggnfa&lang=en

Residential investment (RES) - Eurostat Quarterly Sector Accounts, *Gross Fixed Capital Formation: Dwellings*, retrieved from Eurostat http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nasq_nf_tr&lang=en

Consumer credit (CC) - OECD, OECD.StatExtracts, Finance, Households' financial and non-financial assets and liabilities, *Consumer credit - up to 1 year and more than 1 year*, retrieved from OECD <http://stats.oecd.org/Index.aspx?DataSetCode=TIS>; Bank for International Settlements - Long series on credit to the private non-financial sector, retrieved from BIS <http://www.bis.org/statistics/credtopriv.htm>.

Private non-residential investment (I) – Eurostat Quarterly National Accounts, Eurostat Quarterly Government Finance Statistics and Eurostat Quarterly Sector Accounts, *Gross Fixed Capital Formation - Gross Fixed Capital Formation: Dwellings - General Government Gross Fixed Capital Formation*, retrieved from Eurostat http://appsso.eurostat.ec.europa.eu/nui/show.dodataset=namq_gdp_k&lang=en, http://appsso.eurostat.ec.europa.eu/nui/show.dodataset=gov_10q_ggnfa&lang=en and http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nasq_nf_tr&lang=en

Consumption (C) – Eurostat Quarterly National Accounts, *Households and NPISH final consumption expenditure*, retrieved from Eurostat http://appsso.eurostat.ec.europa.eu/nui/show.dodataset=namq_gdp_k&lang=en

Imports (M) – Eurostat Quarterly National Accounts, *Imports of goods and services*, retrieved from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=namq_gdp_k&lang=en

Military spending – SIPRI military expenditure database

http://www.sipri.org/research/armaments/milex/milex_database

Series in nominal terms were deflated by applying the appropriate deflator. Those portions of the series that were available only at yearly frequencies (Government GFCF for Italy 1991-1998; Germany 1991-1994; France 1978-1990) were interpolated by assuming that the expenditure was split equally between quarters. Those quarterly series that were not seasonally adjusted (Government GFCF for Italy 1999-2014; Germany 1995-2014; Spain 1995-2014) were corrected by applying seasonal dummies. The part of the Consumer Credit series for Spain not covered by OECD data was interpolated by applying the rate of growth of the stock of total credit to households and NPISH provided by the BIS, after having verified that this rate and the rate of growth of the stock of consumer credit (OECD data) are highly correlated in the period covered by both sources. All series were downloaded between July and September 2014.

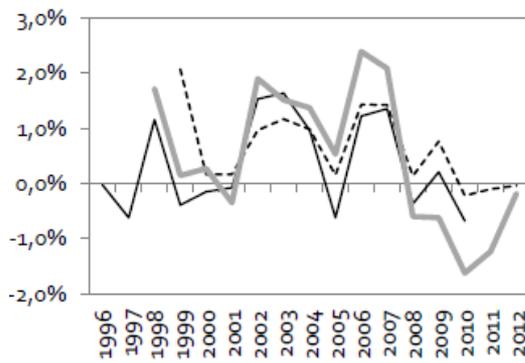
Appendix B: the relative weight of consumer credit flows

As explained in Section 2.1, consumer credit was excluded from the calculation of autonomous demand (Z) for three of our four European countries, due to the unavailability of comprehensive time-series. We have seen that in the US and Spain, for which it was included in the computation of Z, consumer credit (which excludes loans for house purchases) accounts for an exiguous share of Z (Figure 2a, panel a and Figure 2b, panel i). In this Appendix we show, on the basis of the available information, that the same applies to France and Italy (data on consumer credit in Germany are not available; however it appears safe to assume that flows of consumer loans in Germany have not been higher, in relative terms, than in the other three European countries).

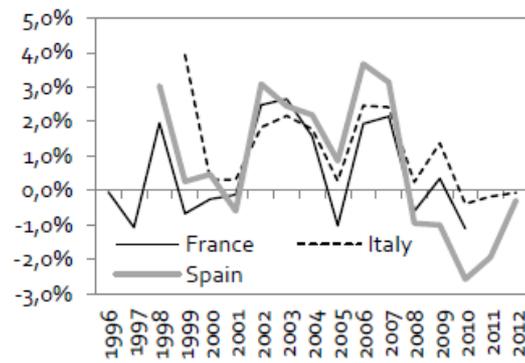
Let us examine the yearly series made available by the OECD, which start in the late Nineties (1996 for France, 1998 for Spain and 1999 for Italy).³³ On average over that period, the absolute value of the yearly net flow of consumer credit³⁴ (CC) accounts for 0.7% of GDP in Italy and France and 1.2% of GDP in Spain. As a share of Z, again taking absolute values, CC averaged 1.2% in France, 1.3% in Italy and 1.8% in Spain.

³³ We include Spain in the figure for the sake of comparison, even if for this country the consumer credit component has been comprised in the empirical analysis.

³⁴ In particular, to calculate the net flow of new consumer credit, we have taken first differences of the end-of-year stock of consumer credit (i.e., the sum of 'consumer credit, up to one year' plus 'consumer credit, more than one year' in the OECD database). The net flow of new consumer credit can thus be negative, as happens in years in which the stock of debt diminishes (meaning that the amount of money used by families to repay past debts has surpassed the amount of new consumer credit conceded).



(a) as a % of GDP



(b) as a % of Z

Figure A1: Net flows of consumer credit (CC)

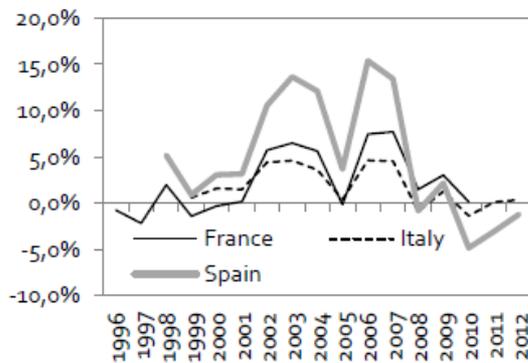
Notes: Calculated as the yearly change in the stock of consumer loans outstanding

Source: Authors' own elaboration on OECD and Eurostat data

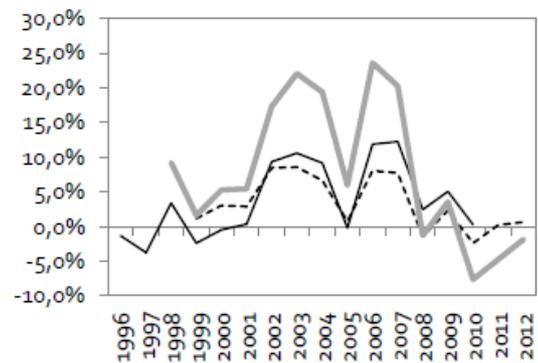
House mortgage loans appear more relevant. On average over the available series, net flows of loans for house purchases amounted (in absolute value) to 6.2% of GDP and 9.9% of Z in Spain; 3.6% of GDP and 5.5% of Z in Germany; 3.0% of GDP and 4.8% of Z in France; 2.1% of GDP and 3.9% of Z in Italy. If we calculate overall households' autonomous spending as the sum of the net flows of consumer loans and loans for house purchases, we see that house mortgages accounted for 70% of the total in France, 73% in Italy and 82% in Spain.

In conclusion, while household debt as a stock may have reached considerable levels, possibly relevant for financial stability, the yearly net flows of consumer credit – which are what matters for our analysis of the impact of autonomous spending on GDP growth – have been very small with respect to overall autonomous demand. To the contrary, borrowings for house purchases (which we included in the calculation of Z, using residential investment as a

proxy) represented the vast majority of households' autonomous spending.



(a) as a % of GDP



(b) as a % of Z

Figure A2: Net flows of loans for home purchases

Notes: Calculated as the yearly change in the stock of loans for home purchases outstanding

Source: Authors' own elaboration on OECD and Eurostat data

Un ringraziamento di cuore va al professor Cesaratto per la pazienza, la fiducia, i consigli, il supporto, un milione di riletture, gli stimoli e molte altre cose.

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