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LONG PERIOD EFFECTIVE DEMAND AND THE SRAFFIAN SUPERMULTIPLIER

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> I am not sure I am prepared to believe in long-run effective demand. (Arrow, 1989, p. 175)

This paper is part of an ongoing attempt (see Serrano, 1995) to offer a contribution to a line of research started by Garegnani (1962) concerning the development of an alternative long-period theory of output and accumulation characterised by two main features: (i) the validity of the Keynesian–Kaleckian principle of effective demand in the long run, that is, in situations which take explicit account of the capacity generating effects of investment expenditures; (ii) the full compatibility of the analysis with the Classical Surplus approach to the theory of value and distribution, revived by Sraffa (1960).

The purpose of this paper is to introduce the concept of the Sraffian (i.e. long-period and with exogenous distribution) supermultiplier,[1] a scheme in which: (i) long-period effective demand determines normal productive capacity; and (ii) the autonomous components of final demand (those expenditures that are neither financed by contractual wage income nor can create capacity) generate induced consumption via the multiplier and induced (capacity creating) investment through the accelerator.

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[1] The term 'supermultiplier' was coined by Hicks (1950) and has later acquired the broader meaning of a formal theoretical apparatus, based on the principle of effective demand, that takes into account both the multiplier and accelerator effects. Since in the present work I have made an effort to keep the analysis entirely compatible with Sraffa's approach I have decided to use the term 'Sraffian supermultiplier'. I am fully aware that this choice of title has a number of drawbacks but has in its favour the virtue of being extremely concise. Note that I am not arguing that something like a supermultiplier can be found in the work of Sraffa nor that he would have agreed with it. Alternatives to the term 'Sraffian' such as 'Classical' and/or 'Neo-Ricardian' had to be discarded as they have been extensively used in the modern literature on macroeconomics and growth theory to represent the views associated with the 'New Classical' economists and their pre-Keynesian neoclassical theories.

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After putting the problem into perspective (Section I), the three subsequent sections present an extremely simplified formal model of the Sraffian supermultiplier and use it to illustrate some features (and possible limitations) of this notion of long-period effective demand. Thus, Section II discusses the notion of induced consumption and the multiplier. Section III discusses the concept of induced investment and the accelerator. Section IV brings the multiplier and the accelerator together producing a Sraffian supermultiplier. Section V closes the paper with a discussion of the role of changes in the degree of capacity utilisation.

I. LONG PERIOD EFFECTIVE DEMAND

I.1. A stylised fact

Theories of effective demand are usually meant to explain short-run fluctuations of the level of output. The theory I shall discuss has a completely different purpose. First of all, the theory is concerned exclusively with explaining long-run trends instead of short-run cycles (and, in fact, abstracts entirely from these fluctuations). In addition, the theory is chiefly meant to explain the evolution of the productive capacity[1] of the economy instead of just the level of output. There is one important 'stylised fact' that this theory ought to be able to provide an explanation for. The stylised fact is that, in most capitalist economies, notwithstanding recurrent cycles, crises, slumps and booms, taking the long view there seems to be, on average, a remarkable balance between the long-run trends of productive capacity and aggregate demand.

For neoclassical authors this particular stylised fact is seen as confirming their view that in the long run, aggregate demand tends to adjust itself to the available productive capacity (or more generally to the endowments of 'factors of production'). As Arrow argued in his 1972 Nobel Prize lecture: 'The balancing of supply and demand is far from perfect. [. . .]the system has been marked by recurring periods in which the supply of available labor and of productive equipment for the production of goods has been in excess of their utilization[. . .] Nevertheless, when due allowances are made, the coherence[. . .]is remarkable' (reprinted in Arrow, 1983, p. 200).[2]

[1] Throughout this work productive capacity refers to the levels of output that can be obtained by operating the economy's stock of (circulating and fixed) capital at its normal or 'planned' degree of utilisation. Note that according to this definition, if the economy is operating at its normal capacity, output that does not mean it has reached either 'full capacity' (as normally there will be some planned margin of spare capacity) nor 'full employment' (as capacity output refers only to capital equipment and there is no reason to assume that the size and form of such stock will be large enough to employ the whole of the available work force).

[2] Some years later, in an interview given to Feiwel, Arrow gave a more concrete example of what he had in mind: 'The US[. . .]created many more jobs in the last ten or fifteen years than Europe has.[. . .]the US labor force had during these years grown a lot more than the European has. And that is not a coincidence! If the Europeans had a lot more people looking for jobs, there would be more jobs' (Arrow, 1989, pp. 175–176). Notice that Arrow is talking about two distinct 'stylised facts' (and their

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Here I wish to explore a completely different explanation for this same stylised fact: I argue that perhaps what we are observing is a general long-run tendency of productive capacity to adjust itself to effective demand. Indeed, that would be the case if the long-run evolution of productive capacity of a capitalist economy is seen as being usually demand-led rather than resource constrained.[1] This work thus aims to offer a preliminary theoretical study of the main properties and implications of a demand-led régime of accumulation, viewed from a Sraffian perspective.[2]

I.2. From effectual to effective demand

The central analytical problem faced in the development of such a long-period theory of effective demand can be put as follows: Is it possible to generalise to the operation of the economic system as whole, the Sraffian 'standpoint' according to which in each isolated sector the long-period level of effective (or 'effectual') demand is the independent variable whilst output and capacity are the dependent ones?[3] Can the Sraffian theory of value and distribution ('micro') lead to a theory of normal capacity output with Keynesian (or Kaleckian) features ('macro')? In other

footnote 2 continued from previous page

common neoclassical explanation). The first relates to the balance between the demand for products to the productive capacity. The second is the idea that there is also a rough long-run balance between employment opportunities and the size of the labour force. There is, however, a much more plausible non neoclassical explanation for this second 'stylised fact' about the labour market. As Garegnani (1990, p. 116) pointed out, such a 'long-run rough coincidence between labour employment and labour seeking employment . . . is only to be expected, to the extent that workers cannot live on air. That rough coincidence may in fact result from employment seeking labour adjusting to employment opportunities rather than the reverse' (Garegnani, 1990, p. 116), through migration, changes in participation rates and 'disguised unemployment' in the informal sector (Bhaduri, 1987). Here, I am concerned exclusively with providing an alternative explanation for the first stylised fact relating to the rough long-run tendency (which of course works slowly and imperfectly in reality) towards a normal utilisation of capital equipment. We shall thus realistically assume that the size of the available labour force does not constitute a binding constraint on the process of capital accumulation.

[1] Now, the size of the capital endowment seems, if anything, even more susceptible of adaptation to its employment than the size of the labour force is. [. . .]it is the level of aggregate demand and output that determines the level of the capital stock' (Garegnani, 1990, p. 116–117).

[2] In interpreting Sraffa's theory I follow closely the views of the three 'core' Sraffians, namely: Garegnani, Schefold and Bharadwaj (Bharadwaj and Schefold, 1990). As is well known, these authors see Sraffa's theory as belonging to a broader tradition which they call the 'Classical surplus approach' to economics. This approach would be characterised by two main features: first, the view that the distribution of income between wages and profits is strongly influenced by institutional and sociopolitical forces; second, the idea that competitive process is based on the mobility of capital (instead of the 'number of agents'). There are, of course, a number of other possible interpretations of Sraffa's theory and also of the Classical approach, but I am not concerned with them here.

[3] For evidence that effective (or 'effectual') demand, i.e. the quantity demanded at the normal (or 'natural') price was the determinant of sectoral levels of output and capacity in the work of the Classical economists see Ciccone (1992) and Vianello (1989). For a discussion of the analogous role of those sectoral 'effectual demands' in the Sraffian framework see Schefold (1990A).

words are we allowed to think that aggregate effective demand is just the summation of the sectoral effective demands[1] (Eatwell, 1979, 1983)?

Evidently we cannot obtain system-wide or macroeconomic propositions by merely looking at what happens at the sectoral or 'micro' level. A satisfactory 'macro' theory will require the consideration of certain fundamental structural relationships that emerge only when the economy is considered as a whole (as a system).[2] Given the questions we are concerned with, there are two such structural relations that we must take into account. The first concerns the circular flow of income, i.e. the reciprocal relations between (consumption) expenditures, the income generation process and firms' decisions to produce. The second concerns the dual character of investment (as a source of both demand and capacity), the technological relation that connects investment expenditures and the creation of productive capacity.[3]

The problem is to show in what sense and under which conditions it is possible to say that the economic system as a whole is demand-led (and hence causation still runs from effective demand to output and capacity) even taking into consideration the unavoidable degree of interdependence and the feedback effects that arise from both the dual character of investment and the circular flow of income.

The study of these relations has led us to divide long-period aggregate demand into three components, namely, induced consumption, induced investment and autonomous expenditures. From the study of the circular flow of income we obtain induced consumption, which in our framework consists of the proportion of the wage and salary bill that is spent. This is the only component of aggregate demand that comes as a direct consequence of the contractual incomes that are paid when firms decide to undertake production.

[1] What matters is the aggregate level of effective demand in real (not nominal) terms. Therefore, even if we know the prices of production of all commodities, we can only convert the corresponding vector of sectoral effectual demands into the scalar aggregate effective demand after we specify a numeraire. The latter can be either the money wage or the price of a particular commodity (or bundle of commodities).

[2] Pasinetti (1981, p. 35, n.6) calls such relationships 'truly macro-economic' relations. These relations express essential structural features of the economic system, viewed in its totality, and are not simply the result of aggregation. Godley and Cripps also consider those relationships crucial to macroeconomics: 'The evolution of whole economies', . . . 'is a highly contingent historical process. We do not believe that it is possible to establish precise behavioural relationships' . . . 'comparable to natural laws[. . .] On the other hand we must exploit logic so far as we can. Every purchase implies a sale: every money flow comes from somewhere and goes somewhere: only certain configurations of transactions are mutually compatible. The aim here is to show how logic can help to organize information in a way that enables us to learn as much from it as possible. This is what we mean by macroeconomic theory' (Godley and Cripps, 1983, p. 44).

[3] Loosely speaking, in macroeconomic theories assumptions (which are often implicit) about the first of those two relations are reflected on the way the 'multiplier' mechanism is treated, whilst the assumptions about the second relation (concerning the circular flow of income) appear in the way the 'accelerator' relation is treated (and interpreted). Since Harrod and Domar the Post-Keynesian literature on formal growth models has concentrated on the dual character of investment usually neglecting the question of finance. On the other hand, the literature that examines more carefully the circular flow of income and the way expenditures are financed often tends to completely ignore the capacity effects of certain expenditures. Examples of the latter can be found in the New Cambridge stock-flow literature (Godley and Cripps, 1983), and the Franco-Italian monetary circuit school (Graziani, 1989).

Consideration of the dual character of investment has brought with it the concept of induced investment which, in our case, consists of the current level of gross capacity generating investment (i.e. purchases of produced means of production in both fixed and circulating capital) that is required to endow the economy with sufficient productive capacity to meet the level of effective demand which is expected to rule in the immediately subsequent period.

Finally, autonomous expenditures are all those expenditures (whether formally classified as consumption or as 'investment') that are neither financed by the contractual (wage and salary) incomes generated by production decisions, nor are capable of affecting the productive capacity of the capitalist sector of the economy.[1] Autonomous expenditures thus constitutes the part of long-period aggregate demand which is completely independent of the 'supply' side (i.e. output and capacity) of the economy.

As we shall see, we can characterise the economic system as being demand-led provided that two conditions are met, namely:

(i) that the combined share of induced consumption and induced investment in normal output and capacity adds up to less than one, or, in other words, the economy's long-period overall marginal propensity to spend is lower than one;

(ii) that there is a positive level of autonomous expenditures in long-period aggregate demand.

If these two conditions are met we obtain the long-period Sraffian supermultiplier (Sraffian mainly because income distribution is an exogenous parameter and normal prices and 'planned' degree of capacity utilisation prevail) in which the long-period level of output and normal productive capacity are equal to, and determined by, long-period effective demand. That level of effective demand, in turn, will be a multiple of the level of autonomous expenditures; a multiple that well be greater the larger is the economy's marginal propensity to consume and the higher is the share of induced investment.[2] However, given that the share of induced investment is an

[1] The types of expenditure that should be considered autonomous according to our criterium include: the consumption of capitalists; the discretionary consumption of richer workers that have some accumulated wealth and access to credit; residential 'investment' by households; firms's discretionary expenditures (that are sometimes classified as 'investment' and sometimes as 'intermediate consumption' in official statistics) that do not include the purchase of produced means of production such as consultancy services, research & development, publicity, executive jets, etc. (on the growing importance of this type of 'unproductive' expenditure in modern capitalism, see Cowling, 1981); government expenditures (both consumption and investment); and total exports (both of consumption and of capital goods since the latter do not create capacity within the domestic economy).

[2] According to Garegnani (1983, p. 75, emphasis in the original) 'a satisfactory long-period theory of output does not require much more than (a) an analysis of how investment determines savings through changes in the level of productive capacity (and not only through changes in the level of utilisation of productive capacity); (b) a study of the factors affecting the long-run levels of investment; and (c) a study of the relation of consumption expenditures and aggregate income.' Accordingly, our Sraffian supermultiplier is based on a particular view of: the accelerator relation and the nature of induced investment (related to Garegnani's item (b)); the notion of induced consumption and the multiplier; and the role of the autonomous components of aggregate demand (the latter two refer to Garegnani's item (c)). These hypotheses gives us the Sraffian supermultiplier (which is meant to take care of Garegnani's item (a)).

increasing function of the desired rate of growth of capacity (because of the technical relation expressed by the accelerator), that system can only be considered fully demand-led for rates of growth of capacity that lie below a well-defined maximum. This maximum growth rate will depend on the economy's overall marginal propensity to save and capital–output ratio. Below that limit the Sraffian supermultiplier operates fully and both the *level* and the *rate of growth* of productive capacity is unambiguously demand-led.

II. THE CIRCULAR FLOW OF INCOME

II.1. A simple model

In order to keep the analysis as simple as possible and yet sufficiently precise, I shall make use of an exceedingly simple model.[1] We will assume that the technical conditions of production and the real wage (or the rate of profit) are exogenously given in a way that is consistent with the Sraffian theory of prices of production. There is free competition (free entry and exit) and this leads to an uniform rate of profit for all producers. The model depicts a single product circulating capital economy with no scarce non-reproducible inputs, where a single commodity is produced by means of itself and of homogeneous labour, under constant returns to scale. We shall abstract entirely from government spending and taxation and foreign trade.

II.2. Induced consumption

Let us look first at the circular flow of income. Here the key feature is to establish that it is effective demand that determines output, in spite of the 'circularity' of the income flow lies, of course, on the multiplier mechanism. As Kaldor once put it, in the aggregate 'demand is the sum of two components, an endogenous component that varies in *proportion* to the costs incurred by entrepreneurs (which constitute the income of wage and salary earners) and an exogenous component which is financed out of capital — by borrowing or by the sale of financial assets, which comes to the same thing . . .' (Kaldor, 1989, p. 90, emphasis in the original). The same view is behind Kalecki's famous aphorism 'capitalists get what they spend, workers spend what they get'.[2]

[1] Before we start we must make two important preliminary remarks. First, as we are concerned only with a long-period theory of output and productive capacity, in order to avoid the recurrent repetition of the same adjectives from now on all relevant variables (such as consumption, investment, income, capacity, marginal propensity to consume, distribution of income, technology, etc.) will be considered as being at their 'normal' or 'long-period' values, and in real instead of nominal terms (unless it is explicitly stated otherwise). Second, all variables that can either be taken in gross or net terms will be reckoned exclusively in gross terms. Therefore, from now on whenever I use a term such as 'investment', for instance, what I really mean to say is the real long-period level of (capacity generating) investment expenditures reckoned in gross terms.

[2] As is well known, Kalecki's aphorism is based on the assumptions of a closed economy and abstracting from government activity. Perhaps it should be restated as 'Capitalist get what they spend *when* workers spend what they get' to stress the fact that if the workers save, capitalists will get less than what they spend (i.e. realised profits equal capitalist expenditure minus workers' savings).

For both Kalecki and Kaldor the central idea behind the principle of effective demand is that it is current aggregate demand (expenditures) that uniquely determines the flow of realised current aggregate income; in other words, in a capitalist economy profits are only realised (and hence can only properly be said to exist) when and if the product is actually sold. This means that in a capitalist economy, firms' decisions to produce can only automatically[1] generate or induce the contractual incomes that constitute their wage and salary costs. Therefore, only the expenditures of wage and salary earners out of current income can legitimately be considered as being financed by the income generated by current production. All other expenditures are necessarily financed by changes in the net financial asset position of the agents (spending previously held money or new credit creation) and *not* by current income. All those expenditures are not (and logically cannot) be financed by the income generated by current production decisions. As Kalecki (1971, pp. 78–79) put it 'capitalists may decide to consume and to invest more . . . but they cannot decide to earn more'.[2]

II.3. The multiplier

Kaldor also noted that 'Keynes identified exogenous demand with investment (I) and endogenous demand with consumption (C)' (Kaldor, 1989, p. 90) and explained that actually 'exogenous demand can be one of a number of things, of which capital expenditure — 'investment' — is only one' (Kaldor 1983, p. 8)).

In our simple model, the components of 'exogenous demand' will consist of two things; namely, gross capacity generating investment and the autonomous expenditures of the capitalists. The determinants of the level of investment will be discussed in the next section. At the moment all that matters is that gross investment

[1] It might be objected that I am neglecting the problem of production finance, in other words of how firms get hold of the cash to pay their wage bill. I do not deny that this might be an important problem for particular firms but here I am concerned only with the consequences of production decisions and the firms that happen to be unable to get the cash to pay wages and not going to be able to undertake production anyway.

[2] Another objection could be raised here as to the fact that labour is not the only input and the decision to produce could be seen as inducing also the demand for circulating capital goods. Kalecki gets around that question by working with vertically integrated sectors (which he calls departments) and hence in his theory the proposition that the only source of demand automatically induced by current production is the consumption of the workers out their current wage income, has to be taken to mean the only source of *final* demand (gross investment plus final consumption minus intermediate transactions) that is generated etc. This approach (that is implicitly used in most, if not all, Keynesian macroeconomic models) has the clear disadvantage of assuming that the replacement of any used up circulating capital goods is certainly going to happen, while no such assumption is made about the replacement of used up fixed capital goods, as investment in fixed capital is usually considered as given in gross terms). Production decisions will only imply that the replacement actually happens if the economy is stationary since current gross investment depends on the next year's rather than on the current year's level of output. In the present framework, production means *buying* labour and using (*not* buying) capital goods. Buying inputs is seen not as part of production decisions but as gross investment (expenditure decisions), whether that refers to fixed or circulating capital, whether motivated by replacement or for increases (or decreases) in future production. Hence, in general, the only source of aggregate demand (including gross investment) that should be seen as being generated automatically by the *production* decisions of the firms are the workers' consumption out of their current wage income.

should be seen as being completely exogenous from the point of view of the circular flow of income (but certainly not exogenous to the system as a whole, as we shall presently see when we introduce the accelerator relation). Capitalists' autonomous expenditures will, in accordance with our previous argument, also be exogenous. I am also going to assume that wage earners have no access to credit nor accumulated wealth. Furthermore, wage earners' marginal propensity to consume (i.e. the proportion of the wage that is spent) will be assumed to be equal to one. Hence workers 'spend what they get'.

Under these simplifying assumptions there are only three sources of demand, namely, the exogenous levels of investment and autonomous expenditures of the capitalists and the induced consumption of the workers. The latter is equal to the wage bill vlX, where v stands for the (given) real wage (which, by the way, is assumed to be paid 'post factum'), l is the labour input coefficient and X stands for gross output/income (note that vl is the share of wages in gross output/income. Aggregate demand (D) will then be equal to:

$$D=Z+I+vlX \tag{1}$$

where Z represents the autonomous components of aggregate demand (lumping together both capitalists' consumption and the part of 'investment' that does not have any capacity generating effects), and I stands for the current level of gross capacity generating investment.

The above equation shows that the level of effective demand will be an increasing function of the level of output that firms decide to produce, due to the fact that in order to produce more firms must hire more workers and pay their wages (which will all be spent on consumption).

From the principle of effective demand, we know that the level of output the firms as a whole will want to produce must be equal to the level of aggregate effective demand. Therefore, on the further assumption that firms as whole in the long run manage to adapt their production decisions to the level of effective demand, i.e. if;

$$X=D. \tag{2}$$

Then replacing (2) in (1):

$$X=\frac{Z+I}{(1-vl)} \tag{3}$$

We have established, then, that the level of output firms wish to produce will be a multiple of the level of autonomous expenditures plus capacity generating investment, and that the multiplier will be greater the higher is the marginal propensity to consume (which in this case equal to the share of wages in gross income).

Therefore, in spite of the feedback effect of induced consumption, the level of output is demand determined in the sense that autonomous expenditures (capitalist consumption plus non capacity creating investment) plus capacity creating investment and the marginal propensity to consume (gross wage share) are the independent variables, while output is the dependent one.

II.4. The marginal propensity to consume

Note that economically meaningful solutions for equation (3) require that two formal conditions are met, namely:

$$vl < 1 \tag{4}$$

$$(Z + I) > 0. \tag{5}$$

Condition (4) states that the aggregate marginal propensity to consume (in this case equal to the gross wage share) must be less than one. Given that the aggregate marginal propensity to consume measures precisely how much consumer demand is induced by the firms' decision to produce, it is clear that if that propensity were to be equal to one then Say's Law would hold, and supply would be automatically creating its own demand. Oddly enough, given the crucial importance of that condition for his *General Theory*, Keynes explained the fact that the marginal propensity to consume of 'the community' was lower than one by reference to a fundamental psychological law according to which increases in income lead to increases in consumption but not of the same magnitude as the increase in income.[1]

However, in the Kalecki–Kaldor view of the income generating process, the only part of demand that can be considered as being directly induced by the firms' decisions to produce are the consumption expenditures of wage and salary earners out of their labour income. This being the case, provided the share of wages and salaries in gross income is less than one, which seems to be a reasonable assumption to make when dealing with a capitalist economy, the aggregate marginal propensity to consume will always be lower than one, even in the case when each worker's individual marginal propensity to consume is equal to one (and thereby they all violate Keynes 'fundamental law').

[1] The fundamental psychological law, upon which we are entitle to depend with great confidence both a priori from our knowledge of human nature and from the detailed facts of experience, is that men are disposed, as a rule and on the average, to increase their consumption as their income increases but not by as much as the increase in their income' (Keynes, 1936, p.96). It is a bit worrying that such an important result relies on such a dubious 'fundamental psychological law', which in any case does not seem to fit very comfortably within a Sraffian framework which stresses the objective structural features of the capitalist economy. Fortunately, in the Kalecki–Kaldor interpretation of the principle of effective demand and the multiplier that we are using here there is no need to rely on Keynes fundamental psychological law to make sure condition (4) is met.

Therefore the Kalecki–Kaldor version of the principle of effective demand that we are using here is not grounded on psychological laws based on our knowledge of 'human nature' but on two fundamental features of any capitalist economy; namely, (i) that profits are generated by selling the product and not by merely producing it and (ii) wages and salaries do not take up the whole of the gross product, i.e. there is always a positive share of gross profits.

The other formal condition (condition (5)) states that there must be a positive level of autonomous expenditures plus capacity creating investment; that is, expenditures that are both decided and financed independently of the current level of output (income). There are two reasons why this condition is required. The first is that we can only say that demand determines output if at least a part of demand is independent from output (income). The second is perhaps less obvious. The point is that since we are assuming that the marginal propensity to consume is less than one, then equality between aggregate demand and aggregate supply (output) necessarily requires that some 'autonomous' injection of demand (and purchasing power) enters the circular flow otherwise, at all levels of output, aggregate supply will be greater than aggregate demand and no positive level of production would be profitable.

III. THE DUAL CHARACTER OF INVESTMENT

III.1. Investment and capacity

We now turn to the dual character of investment; that is, to take into explicit consideration the fact that investment expenditures are not only part of aggregate demand but can also have capacity generating effects. This is the reason why we have divided gross investment expenditures into two distinct categories: capacity generating and non capacity generating, where the former (I) can be defined as those expenditures whose purpose is to affect the potential supply of marketable output in a particular economy.[1] This is also the reason why we have lumped together the non capacity generating part of investment and capitalist consumption as the autonomous components of aggregate demand (Z).

Certain necessary technical relations must hold for the capacity generating part of investment expenditures. Because this type of expenditure creates capacity and that inputs must precede outputs, a given level of gross capacity generating investment in the current period t will have the effect of creating a certain level of gross capacity output in the subsequent period, $t+1$.

The amount of capacity output thus generated will depend on the current technical conditions of production, which for the sake of simplicity, we shall take as being adequately described by the current period's (gross) capital–output ratio (a).

[1] This is how Garegnani (1962, p. 92) has defined investment. He seems either to have left out (or implicitly included in final consumption) other expenditures by firms which cannot add directly to their productive capacities.

This ratio tells us how much gross investment is required to generate one unit of gross capacity output one period hence.[1]

III.2. Induced investment

Investment (whether of the capacity generating type or not) is always exogenous or autonomous from the point of view of the circular flow of income and the multiplier mechanism. On the other hand, given the dual character of investment, gross capacity generating investment can, in principle, be considered as being either induced or autonomous in its connection to the process of creating capacity. Gross capacity generating investment is considered induced when its function is to adjust productive capacity to effective demand. Any other capacity generating investment expenditures, that are determined independently from the adjustment of capacity to demand should be considered (in this sense) as being autonomous.

Note that from our definition of capacity generating investment expenditures, it follows that when this type of investment is induced, productive capacity is necessarily a consequence of the evolution of effective demand. On the other hand, when capacity generating investment is autonomous it is productive capacity that emerges as a necessary consequence of (autonomous) investment.

Now, the Sraffian vision of the normal operation of the market mechanism, with each market being characterised by its 'point' of effective (or 'effectual') demand and its corresponding price of production, already seems to contain an implicit long-period theory of capacity generating investment The nature of such implicit theory becomes clear once we notice that in the Sraffian characterisation of the market mechanism, competition forces firms to adjust productive capacity to demand. Indeed, the view that capacity of each sector is adjusted to normal level of effectual demand in every long-period position, necessary implies treating the long-period level of capacity generating investment as an endogenous magnitude.

The level of gross capacity generating investment present in a long-period position is thus uniquely determined once the current technical conditions of production and the (expected) levels of effectual demand in the subsequent period are known. Anything else can affect long-period investment only indirectly, by affecting either technical conditions of production (capital–output ratios) or the future levels of effectual demand.[2]

[1] The labour coefficient (l) completes the specification of this simple technology.

[2] Most Sraffians would readily agree that aggregate net investment depends on the growth of aggregate demand following the old 'acceleration principle' and that this constitutes one of the main determinants of investment (the other being technical change). The earlier statement of that view comes from Garegnani who argued that the factors that explain aggregate investment in the long run '. . . can be reduced to two: the expansion of final demand and technical innovations' (Garegnani, 1962, p. 91, my translation). However, what has gone relatively unnoticed (a partial exception being Caminati, 1987) is the fact that the Sraffian characterisation of the market mechanism in terms of long-period positions implies much more than this loose connection between the *growth* of aggregate demand and total net investment. Consistency with the Sraffian vision seems to imply a very precise connection between the *levels* of gross capacity generating investment in each and every sector in one period and the *levels* of effectual demand and *gross output* in the subsequent one.

Note that although nothing prevents individual firms from making autonomous capacity generating investment decisions, if those decisions reach any substantial magnitude they would inevitably lead to the creation of undesired excess capacity and hence lead to offsetting reductions in the induced capacity generating investment of other firms. In other words, given the competitive pressure to adjust capacity to demand, in the long run autonomous capacity generating investment tends to 'crowd out' the induced. As Harrod once put it, 'in the long run all [capacity generating] capital outlay is justified by the use to which is put' (Harrod, 1948, p. 79).[1]

If we apply these ideas in the context of this simple model we see that this type of investment will depend on two elements; namely, the future expected level of effective demand (D_{+1}), which tells us how much capacity firms will need, and on the current technical conditions of production (represented in this simple model by the normal capital–output ratio) which tells how much capacity generating investment is required to obtain each unit of productive capacity.[2] Thus:

$$I = aD_{+1} \tag{6}$$

III.3. The ratio of investment to capacity

There is another important relationship that is a necessary consequence of the technical relation between the level of gross capacity generating investment and the amount of capacity created by it. This relation shows the necessary link (under given technical conditions of production) between the current *share of capacity generating investment in capacity output* on one side and *the rate of growth of capacity* (between the current period and the subsequent one) on the other. Indeed, given the capital–output ratio, a higher rate of growth of capacity will necessarily require that a higher share of the current level of capacity output be dedicated to capacity generating investment.

In order to see why this is the case, it is enough to go back to our initial relation between the level of capacity creating investment and the level of capacity output generated by it. If it is true that a certain absolute level of gross investment creates a particular level of capacity output in the following period, then it also has to be true that a certain level of investment, relative to the current level of capacity output, must create a specific level of capacity output next period, also relative to current capacity output. But 'investment relative to current capacity' is exactly the current ratio of investment to capacity (I/X^*). The 'future level of capacity output, relative to the present level' is also one and the same thing as (one plus) the future rate of growth of capacity. This being so, then the positive relation between the current

[1] Note that we are not speaking of a short period theory of investment *decisions* for individual firms but of a theory of the long-period investment *opportunities* that are available in the sector or market as a whole.

[2] Note that since we are dealing with a circulating capital system the whole of the capital stock is used up in each period. Therefore gross capacity generating investment at t is equal to the stock of capital that will be available for production in $t+1$.

level of gross capacity generating investment and the future level of capacity implies also a positive relation between the share of this type of investment in capacity and its future rate of growth. The desired rate of growth of capacity between two long-period positions (starting from one in which the degree of capacity utilisation is at its normal or 'planned' level) will naturally be given by the expected rate of growth of effective demand ($g+1$) between these two periods. Thus:

$$I/X^{\star} = a\,(1+g_{+1}), \tag{7}$$

where the current share of capacity creating investment in capacity is a direct function of both the expected rate of growth of demand and the capital–output ratio.

IV. THE SUPERMULTIPLIER AND THE PROPENSITY TO SPEND

IV.1. The supermultiplier

We now have all the elements that we need to derive the supermultiplier. Replacing (7) in (3) and making normal capacity ($X^{\star}$) equal to long-period output ($X^{\star}=X$) we obtain:

$$X^{\star} = \frac{Z}{[1 - vl - a\,(1+g_{+1})]}\,, \tag{8}$$

where the reciprocal of the denominator is now the Sraffian supermultiplier, which shows that the long-period level of capacity output is a multiple of the level of the autonomous components of final demand. The supermultiplier will be, like the standard multiplier, an increasing function of the aggregate marginal propensity to consume (equal to the gross share of wages in this simple model).[1] On the other hand, unlike the standard multiplier, the supermultiplier depends on the expected rate of growth of demand, which affects the amount of induced capacity generating investment undertaken. The supermultiplier will also depend directly on the capital–output ratio, the higher this ratio, the higher is the level of capacity generating investment induced by a given expected rate of growth of aggregate demand.

Note how the dual character of investment appears in the supermultiplier: current capacity generating investment (at period t) is both a component of demand and will

[1] Note that this simple version of the Sraffian supermultiplier can easily be extended and generalised. For instance, to take into account the possibility of worker's savings all we have to do is: (a) to replace in equation (8) above vl by $c_w vl$, where $c_w<1$ is the marginal propensity to consume out of wages; and (b) include the possible discretionary autonomous expenditures of workers in Z. Fixed capital can also be easily accommodated by simply rewriting the 'propensity to invest' as $a(d+g_{+1})$ where $d<1$ is the depreciation rate (itself known once the technical conditions of production and the distribution of income are given). Multisectoral extensions can also be easily done by turning the scalars into vectors and matrices where appropriate.

provide productive capacity in the following period $(t+1)$.[1] On the other hand, current productive capacity is necessarily the result of capacity generating investment in the previous period $(t-1)$. Therefore the Sraffian supermultiplier (in exactly the same way as the standard Keynesian or Kaleckian multiplier) implicitly assumes that expectations at $t-1$ about current demand at t were shown to be correct.

This two-sided nature of capacity generating investment is often considered as creating a serious difficulty for the development of a long-period theory of effective demand. As Eatwell (1983, p. 282) remarked, 'the problem is that on the one hand investment is assumed to be the independent variable, whilst on the other hand, variation ... in investment is the mechanism by which capacity is adjusted to demand'. The apparent difficulty is resolved when we observe that capacity generating investment is an independent variable only in the multiplier mechanism but it is completely induced as far as the accelerator relation is concerned.

More importantly, while it is true that this type of investment generates both capacity and demand, it does not and cannot do both things at the same time. When capacity generating investment expenditures are made, they only generate demand. They logically can only generate capacity one period later. Indeed, according to Eatwell (1983, p. 282) 'The solution may be found in Keynes's own analysis ... it is not investment which is the independent variable, it is the 'state of long term expectations'. Here Eatwell seems to be arguing that in the long run, investment that can create capacity is induced by the expected rate of growth of effected demand.[2]

IV.2 The long-period marginal propensity to spend

Note that economically meaningful solutions for equation (8) above require that two formal conditions are met, namely:

$$vl+a\,(1+g_{+1})<1 \tag{9}$$

$$Z>0. \tag{10}$$

If we look at condition (9) we see that the first term in the left-hand side is the share of induced consumption in income or marginal propensity to consume (equal to the gross wage share in our simple model). By analogy, we could call the second term in the left-hand side (the ratio of capacity generating investment to capacity)

[1] The non-capacity generating type of investment obviously is only a source of demand. That is why we have put it together with capitalists' consumption as an autonomous component of aggregate demand.

[2] While I fully agree that the 'problem' can be solved in this way [provided that conditions (9) and (10) below are met], it is not clear that Keynes himself would have consistently held this view. Keynes's 'long term expectations' seem to refer to expectations of profitability whilst induced investment depends on the expectation of the level of effective demand. The two, in general are not the same thing.

the (long-period) marginal propensity to invest.If we do that it would be natural to view condition (9) as saying that for the system to be demand-led the overall long-period marginal propensity to spend (induced consumption plus induced investment) out of capacity output must be strictly lower than one.

This is perhaps the best way of looking at the economic meaning of what initially might appear to be a purely formal condition. In particular, this gives us the reason why condition (9) appears as a strict inequality. The problem, is that if expression (9) was satisfied as an equality that would mean that the long-period marginal propensity to spend would be equal to one. But that of course is exactly what we mean by Say's law, i.e. any increase in capacity output would automatically generate an equivalent demand (counting both induced investment and induced consumption) for it.

We may now turn to condition (10), which states that there must be a positive level of autonomous expenditures, i.e. expenditures that are (decided and financed) independently from the current level of output (income) and that do not generate capacity. In our simple model, this means that capitalist consumption plus non-capacity generating investment must be positive.

Continuing the analogy with the previous discussion of the multiplier, we see that the first reason behind this requirement is that we can only say that it is aggregate demand that determines output and productive capacity if at least part of aggregate demand is independent form output and capacity. The second reason why autonomous expenditures must be strictly positive is that if we are assuming that the system has a long-period marginal propensity to spend less than one, we must have autonomous components in final demand; or else no positive level of capacity output could be profitably used. This shows how essential the hypotheses that guarantee the presence of an exogenous level of autonomous expenditures is for any theory that postulates a long-period marginal propensity to spend below unity, or, in other words, for a long-period theory of effective demand.

IV.3. The limits of demand-led capacity growth

Condition (9) above also tells us something important about the limits of demand-led capacity growth. The problem was raised by Steindl in his comment on a paper by Kurz (1990):

> Kurz darkly alludes to the theory that the problem of increasing the rate of accumulation would solve itself by means of the increased output capacity that it would bring in due course [pp. 409–410], he seems to forget that the increased output capacity would materialize only after the investment has been completed, that is, with a considerable time lag, and that savings are necessary precisely to bridge this gap. If additional capacity could be created *simultaneously* with the spending on investment goods there would be no limit to accumulation at all, and we could turn the whole third world into an enormous Manhattan or Hong Kong in no time! (Steindl 1990, p. 416, emphasis in the original).

Given that in our model the 'marginal propensity to invest' (ratio of capacity creating investment to capacity) is an increasing function of the future rate of growth of demand, it is easy to see that if we keep increasing the rate of growth of demand there must come a point beyond which the required investment ratio increases so much that the overall marginal propensity to spend reaches one. At that point we have reached the upper limit of feasible rates of demand-led capacity growth.

Any rate of growth equal to or above that limit is, *ceteris paribus*, incompatible with a positive finite level of capacity output. That limit is only respected if the ratio of capacity generating investment to capacity output is strictly smaller than the aggregate marginal propensity to save. Since, given the capital–output ratio, the share of induced investment is a function of the desired growth rate, this means that the model produces feasible solutions only if the growth rate is not 'too high'. We must therefore assume that the (expected and realised) growth rate of demand satisfies the following inequality:

$$(1+g_{-1}) < \frac{(1-vl)}{a}, \tag{11}$$

where the ratio of the marginal propensity to save to the capital–output ratio will determine the upper bound of feasible demand-led rates of capacity growth.

Note that the supply-side or capital resource constraint represented by this maximum rate of growth of capacity is not purely technological, since this maximum rate is defined only for a given aggregate marginal propensity to save (the gross profit share in our case).[1] The reason is that a given marginal propensity to save implies that a given proportion of current capacity output, equal to the marginal propensity to consume, will necessarily and automatically be allocated to induced consumption. It will therefore not be available for the production of capital goods and hence that provides an upper bound to the possible rates of growth of capacity.[2] The system's maximum rate of capacity growth will, for these reasons, depend positively on the marginal propensity to save (gross profit share) and negatively on the capital–output ratio.[3]

[1] In strictly technological terms, the upper limit for the normal rate of capacity growth would be given by $((1+g_{+1})<1/a)$, the reciprocal of the capital–output ratio. This would occur only if the whole of the current capacity output were to be devoted to capacity creating investment. Note that what this is just the familiar viability condition of linear models that states that the rate of growth cannot be higher than the system's maximum rate of profit.

[2] It is the presence of a positive level of autonomous expenditures that explains why the share of capacity generating investment has always to be strictly below (and can never reach) its upper bound given by the marginal propensity to save, since some part of productive capacity has also to be devoted to the production of the consumer goods that comprise the autonomous demand for consumption and the goods and services that comprise the demand for non capacity generating investment. That is why the constraint appears as a strict inequality.

[3] Note also that in the simple model presented here, where it is the capitalists that do all the saving, condition (9) is merely saying that in this case the rate of growth of capacity must be strictly lower than the rate of profits. That also shows that usually such condition is easily met in a capitalist economy.

This concept of the maximum rate of growth allows us to understand better the roles of both the supply (or saving) and demand constraints on the process of capital accumulation. In order to make the productive capacity grow at a certain rate on the one hand, we have to guarantee that a sufficient share of the existing capacity is allocated to the production of capital goods.

This means that given the capital–output ratio, Steindl is correct insofar as that a high aggregate *marginal* propensity to save is a necessary (but not a sufficient) condition for high rates of capacity growth in the long run. This potentially high rate of growth of capacity, however, will only materialise if the required investment actually occurs. But, in a capitalist economy, the growth of investment by its turn will only be sustainable if aggregate demand actually grows fast enough to ensure that the capacity that is being created is utilised. Therefore, in our model it may be possible, but certainly not profitable, to expand the economy faster than the rate at aggregate demand is growing. Hence, assuming that actual and expected rates of growth of demand roughly coincide, the sufficient condition for a high rate of capacity growth in a capitalist economy that aggregate demand grows at an equally high rate.

Therefore, by characterising the system as being demand led we are assuming that the effective demand constraint, rather than the supply side (saving) constraint, is binding — or, in terms of our model, that the trend growth rate of effective demand is strictly lower than the system's maximum rate of growth.

We have, now, the answer to Steindl's objection. The Sraffian supermultiplier, in a certain sense, inverts Say's Law. In the long run, it is (effective) demand that creates or induces supply (capacity). However, this proposition — which is certainly true when we are thinking in terms of long-period *levels* of demand, output and capacity — must be qualified when we think in terms of *rates of growth*. In the latter case, the rate of growth of demand should also be determining the rate of growth of capacity, but only in a situation in which demand is growing by less than the maximum rate of growth allowed by the technology and the aggregate marginal propensity to save (equal to the gross profit share in our simple model).

This seems to be an interesting way of demonstrating analytically the plausible intuitive idea that, given enough time, capacity can adjust to any particular level of effective demand,[1] while at the same time recognising the constraints that the current availability of capital resources (the proportion of productive capacity that

[1] Cf. Kaldor (1989, p. 155) 'Keynes was undoubtedly right in thinking that, given enough time the production of pretty well everything responds to demand — on account of the fact that the growth of effective demand induces a higher rate of investment increasing capacity.' In the same vein, Godley (1983, p. 157) argued that 'such constraints (whether coming from the side of labour/supply or physical capacity) are essentially of a frictional or short term character . . . the sustained expansion of effective demand is the necessary and sufficient condition for expansion of real output on any scale whatever in the long run'. The concept of the maximum rate of growth allows us to accept these propositions as far as the levels are concerned while at the same time showing their limits of validity in what regards rates of growth.

can be allotted to capacity generating investment) and the technology must necessarily impose on the speed at which the economy can respond to demand.[1]

IV.4. The role of autonomous demand

The autonomous components of demand constitute precisely the part of aggregate demand that cannot be explained as the result of either the multiplier or the accelerator mechanism. Indeed, the evolution over time of such autonomous components necessarily depends on a variety of economic, institutional and technological forces that cannot possibly be reduced to a simple and general formal relation amongst a few 'macro' variables.

The levels and growth rates of the autonomous expenditures depend crucially on factors as diverse as the nature of the financial system and the conditions of consumer credit, the pace of technical change and the process of competition in what regards the product innovation and product differentiation strategies of firms, the relation between managers and owners, Government expenditure (and taxation) policy and, in the case of the open economy, the international competitiveness of the domestic firms (and the country's exchange rate policy).

The virtual impossibility of deriving formally a general 'endogenous' trend for the autonomous components of demand seems to have led the vast majority of multiplier–accelerator theorists to ignore the role of this component of aggregate demand in the explanation of the long-run trends of capital accumulation.

Indeed, in this literature, 'unproductive' investment expenditures that cannot affect capacity are usually ignored. Autonomous consumption, on the other hand, is usually admitted only in the short run (sometimes some autonomous consumption is formally required to provide 'a floor' or turning point for the cyclical 'downswing') but in the analysis of long-term growth the autonomous components are simply assumed to grow in line with either the capital stock or the level of income of the economy, usually with the argument that such expenditures must bear some proportion to the size of the economy.

From our point of view, this is an arbitrary and formalistic justification. What the Sraffian supermultiplier shows is that in the long run the exact opposite is closer to the truth: it seems that it is rather the size of the economy itself that depends partially on the magnitude (and rates of growth) of these autonomous components of final demand. The Sraffian supermultiplier thus provides us with a simple framework for the analysis of accumulation in which effective demand and, in particular, the evolution of the autonomous components of aggregate demand, play

[1] Note, however, that what the maximum rate of growth says is that capacity output cannot grow faster than that rate if the degree of utilisation is to be kept at its 'planned' or normal level. That means that both actual output and also capacity can grow a bit faster at least for a while, to the extent that there are always planned margins of spare capacity. For very high rates of growth of demand such that neither capacity nor output can respond fast enough the result will be demand inflation and 'forced saving' in a way similar to the Cambridge theory of distribution. That means that excessively high rates of growth of aggregate demand are not compatible with taking distribution as an exogenous parameter (in the case of our simple model by 'excessively high' we mean a rate of growth of demand higher than the rate of profits).

a crucial role in explaining long-run growth. It is a theoretical scheme in which, in the long run,

> . . . an increase in resources . . . or in their efficiency . . . will not serve to increase actual production unless the exogenous component of demand is increased at the same time. In many cases the same factor may operate on both but this is not necessarily so, nor there is any presumption that the rate of growth of the one will be closely geared to the rate of growth of the other . . . an increase in potential output will automatically induce a corresponding growth of actual output . . . only . . . if exogenous demand expands at the same time to the required degree; and . . . this cannot be taken for granted (Kaldor, 1983, p. 9).

Our Sraffian supermultiplier consists precisely in an attempt to study a system in which a particular evolution of the autonomous components of aggregate demand is not 'taken for granted'.[1]

V. THE ROLE OF CAPACITY UTILISATION

V.1. The degree of capacity utilisation

By spelling out clearly the conditions under which capacity can adjust to demand, the Sraffian supermultiplier also implicitly provides us with a theory of the behaviour of the actual degree of capacity utilisation in the long run. Indeed, the (average) actual degree of utilisation is nothing more than an indicator of the extent to which (normal) demand and (normal) capacity are balanced. According to our supermultiplier, decisions to purchase capacity generating commodities (i.e. capital goods proper) will be in the long run completely dominated by the firms' competitive imperative to attempt to adapt capacity to demand. This adjustment is, in principle, feasible for the economy as a whole if induced capacity creating investment is determined by the technology and by the long-run evolution of effective demand.

Thus, if firms as a whole try to adjust capacity to demand and if this adjustment is possible when they (taken as a whole and on an average) manage to forecast demand appropriately, then we can conclude that systematic departures from the normal or planned degree of utilisation in the long run can only be attributed to a persistent collective failure, on the side of those firms, to anticipate the evolution of effective demand. In other words, persistent differences between the average actual and the planned degree of utilisation are a consequence of (and solely of) a definite and systematic bias in the firms' long-term demand expectations.

If we denote by D the level of effective demand (and output) actually realised in a given period t and by $X^{\star}$ the (normal) level of capacity output in that same period we have that the actual degree of utilisation in period t is given by:

$$u = D/X^{\star}, \tag{12}$$

[1] In a similar vein see Bortis (1984, 1993), who independently developed a supermultiplier analysis that seems to point to an approach similar to the one being suggested here.

where $u=1$ denotes a situation in which the actual degree of capacity utilisation is equal to its planned level.[1]

According to the hypotheses of our Sraffian supermultiplier, the single determinant of the level of capacity that firms would want to have available at any period t is equal to the normal effective demand for that same period. Therefore their investment behaviour in period $t-1$ was necessarily guided solely by the (then) current technical conditions of production (at $t-1$) and the level of effective demand they then expected to rule during period t.

The consequence of such behaviour is to endow the economy with a level of normal capacity output in period t that is identical to the level of effective demand that was expected to materialise by then. Hence normal capacity at time t is always equal to the expectation, formed at $t-1$, of normal demand in period t (which we will denote by D^e).

Now, the actual degree of utilisation during period t is, by definition, the ratio between the actually realised level of normal effective demand and normal capacity output. But if normal capacity is equal to the demand that was expected for this period, we have that the actual degree of utilisation in any period will be equal to the ratio of realised to (previously) expected normal effective demand for that same period. Planned or desired utilisation of capacity will obtain only if expectations were justified and under (over)estimates of current normal effective demand will lead to unplanned over (under)utilisation. Formally:

$$u=D/D^e. \tag{13}$$

This simple 'theory' of the actual degree of utilisation in the long run emerges as an inevitable logical consequence of the assumption that the desired level of normal capacity output is determined via the supermultiplier by effective demand. It might seem terribly obvious, but it has one very important implication. It shows that, in a Sraffian supermultiplier framework, saying that the actual degree of utilisation in the long run is systematically different from the planned one is one and the same thing as saying that there are persistent collective 'mistakes' or a bias in long-term demand expectations.[2]

These observations bring us to the distinction between the actual long-run behaviour of the economy and the analysis of that behaviour by a path of theoretical

[1] Note that u can also be (within certain limits) greater than one as we are allowing for a margin of planned spared capacity (roughly given by the usual ratio of peak to average demand). On the notion of planned, 'desired' or normal degree of capacity utilisation, see Ciccone (1986, 1987) and Kurz (1990).

[2] Note, however, that Garegnani has argued that 'Even correct foresight of future output will not eliminate average utilization of capacity at levels other than the desired one' (Garegnani 1992, p. 59). This peculiar conclusion follows from the fact that he explicitly takes the initial arbitrary level of capacity' as *exogenously* given by history. He would not have reached such conclusion had he only asked himself why was that 'initial' level of capacity output put there in the first place (for the answer would be precisely because firms had expected that such was going to be the level of normal effective demand that would be forthcoming in that period).

long-period positions in which capacity is adjusted to demand.[1] It is clear that the long-run behaviour of an economy will only be well explained by a sequence of this type of (theoretical) long-period position if there are reasons to think that, on the whole and on the average, demand expectations are not systematically biased (or to put it in a slightly different way, that whatever bias that might be empirically observed is not systematic enough to form a clear trend susceptible to theoretical explanation). Under those conditions the path of long-period positions will provide the best (no matter how imperfect) explanation of the average long-run[2] behaviour of the economy.[3]

If expectations do happen to have a strong systematic bias in any direction then the actual path of the economy in the long run will move systematically away from the path formed by the corresponding sequence of long-period positions, causing the average actual degree of utilisation to deviate persistently from the planned degree. Note that if these deviations are of a considerable magnitude then, while it can still be true that induced investment depends on expected demand, one cannot really say that (realised) normal effective demand determines capacity in the long run. In other words, the statement that capacity adapts to demand in the long run (a statement which we are taking here as a generally agreed upon 'stylised fact'), logically implies that the long-run trend of investment can (or to put it more bluntly, must) be well explained by changes in the technical conditions of production and the (actually realised and, on the whole and on average, correctly anticipated) long-run trend of effective demand.[4]

[1] Long-period positions are here taken to mean 'situations . . . resulting from the adjustment of production and productive capacity to the level and composition of demand' (Vianello 1985, p. 71) and where normal prices prevail. For a similar view see also Eatwell (1979, 1983). We may also note in passing that Keynes seemed to be convinced that a long-period theory of accumulation should refer to positions in which capacity is adjusted to demand. In fact, in a letter to Joan Robinson commenting on a paper by Kalecki, Keynes asked '. . . Is it not rather odd when dealing with 'long-run problems' to start with assumptions that all firms are always working below capacity?' (Keynes, [1941], 1991, p. 531).

[2] Vianello (1989) has convincingly argued that long-period positions are unlikely to ever be *exactly* equal to the corresponding long-run averages of observed market magnitudes (prices and quantities) but nevertheless still provide the best (though imperfect) theoretical explanation for these averages.

[3] Note that postulating a tendency of capacity to adjust to demand does not imply denying the argument, put forward by Garegnani (1979) and Ciccone (1986) that gravitation of market prices towards (or around) their normal or long-period values can occur much faster than the corresponding adjustment of both sectoral and aggregate capacity to the corresponding normal levels of effective demand. That faster gravitation of prices is to be expected since in general changes in productive capacity can take a long time whilst market prices (say after an unexpected change of technique) can start tending towards their new normal levels rather quickly, as soon as '*some* producers have adopted the new method, the competition between these and those who are still using the old method will be in general sufficient to render effective the new price system' (Garegnani, 1979, p. 137, emphasis in the original, my translation).

[4] Garegnani (1962, 1982, 1992) seems to have been particularly impressed by the seemingly large quantitative effects on the future evolution of capacity of even a *temporary* underutilisation of existing productive capacity on the grounds that '. . . even a small degree of excess capacity may involve a failure to obtain an appreciable increment in investment obtainable by using the initial excess capacity. [. . .]such a potential increment of capacity grows over time . . . at a compound rate . . .' (Garegnani, 1992, p. 50). Note, however, that equally large but symmetric capacity effects would also happen in

footnote 4 continued overleaf

V.2. Structural change and the supermultiplier

There is a widely held belief according to which long-period positions (understood here in the very restricted sense of theoretical positions characterised by a balance between capacity and demand) are necessarily associated with stationary or steadily growing economies. In this popular view, long-period positions are incompatible with a process of accumulation in which either the structure of the economy or its rate of growth is changing over time.[1]

In principle, however, there is no incompatibility between long-period positions and structural change as such (see Pasinetti, 1981 and Schefold, 1990B). Deviations from long-period positions (and hence departures of the actual degree of utilisation from its planned levels), important as they might be in practice, are not the result of structural change as such but of *unexpected* changes in demand (and thus possibly the result of equally unexpected changes in the structure of the economy). What the Sraffian supermultiplier tells us is that, in general, all foreseen changes in the structure of the economy which imply changes in normal effective demand will, through their accelerator effects, have an impact on the long-period levels of normal capacity output themselves. Thus only unexpected changes can make the actual degree of utilisation of those productive capacities deviate persistently from their planned levels.[2] Indeed, our Sraffian supermultiplier formula (equation (8) above) remains equally valid also in the presence of structural change. The crucial point is that in the general case, g_{+1}, the expected rate of growth of aggregate demand, will naturally be different from the current rate of growth of autonomous expenditures whenever the latter or the other parameters of the model, such as the capital–output ratio and marginal propensity to save, are expected to undergo changes over time (in other words, whenever the supermultiplier itself is expected not to remain constant over time).[3]

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footnote 4 continued from previous page

situations of temporary *overutilisation* of existing capacity. Thus, in order to demonstrate the importance of the effects of temporary episodes of underutilisation for the long-run evolution of capacity a further argument would be necessary explaining why we should expect episodes of *unplanned* underutilisation are on the average more common and/or of greater magnitude than those of unexpected overutilisation of capacity. This further argument would then inevitably boil down to an assumption that firms for some reason tend to be persistently *overoptimistic* about the long-run evolution of effective demand. Such a reformulated argument would thus only confirm our own general point that departures from the planned degree of utilisation are to be explained exclusively by systematically biased expectations of demand.

[1] Joan Robinson (1962) was a major exponent of this view and always associated what she called conditions of 'tranquillity' to steady growth and has also popularised the idea that if the structure of the economy is changing we must necessarily do 'traverse' analysis, i.e. study the disequilibrium process of transition between one steady growth path to another.

[2] As Keynes (1936, p. 48, n.1) said, 'long period conditions are not necessarily static. [. . .]the only condition is that the existing expectations should have been foreseen sufficiently far ahead'.

[3] For a different point of view see Trezzini (1994).

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