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CYCLES AND GROWTH

A NOTE ON DEVELOPMENT IN A MARKET ECONOMY

Pierangelo Garegnani and Attilio Trezzini

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Abstract of the paper

The paper moves in a theoretical context in which the level of economic activity is dependent on aggregate demand in the long as well as in the short period. The paper shows that given two simple hypotheses the economy will exhibit a tendency to grow independently of the average level of investment (or other 'autonomous' demand) over time. The two hypotheses are a) that investment oscillates over time and b) that the community's marginal propensity to consume is lower when income contracts in the slumps than when income increases. The two assumptions thus point to a possible source of growth which is endogenous to the system.

CYCLES AND GROWTH: A NOTE ON DEVELOPMENT IN A MARKET ECONOMY

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Summary: 1. Introduction; 2. General assumptions; 3. The diagram; 4. The expansionary effect; 5. The effect with proportional, and with decreasing average investment; 6. Obstacles to the perception of the effects; 7. Not a model of growth

1. The variability of the average and marginal short period propensities to consume and, in particular, the comparative rigidity of social consumption when income decreases rather than increases, have long been noted and debated.[1] Yet insufficient attention seems to have been given to how that variability hides an endogenous mechanism of growth for market economies. As we shall see, a marginal propensity to consume that is lower in recessions than in booms entails that aggregate demand, and hence the social product, will tend to grow over time merely as a result of the oscillation of investment and, therefore, even if the average level of investment ("autonomous expenditure") remain constant from cycle to cycle.

The general theoretical background of our arguments is one in which the level of economic activity is understood to depend on aggregate demand in the long period where productive capacity can change, as well as in the short period where it is a given: the theoretical basis of this background has been discussed elsewhere by the present authors.[2] It is however a characteristic of the present paper that it does not approach the question of aggregate demand in the more usual terms of a dichotomy between autonomous and induced expenditures: attention will instead be focussed on the cyclical fluctuations of investment and income, which often seem to have been considered as irrelevant for determining the long-run trend of the social product.

The limited aim of this paper is to present in its simplest form the above strictly logical results. Differences in the marginal propensities to consume in the different phases of the cycle are accordingly assumed without attempting any theoretical or empirical justifications of them.[3] Equally we are only concerned with one of the two aspects of the investment process: that for which investment operates on the *aggregate demand*. The supply side, for which investment contributes to productive capacity has to do with the explanation of the average levels of investment over time, and is therefore beyond our present pur-

[1] See in particular Duesenberry (1948), (1949), and an earlier article by Samuelson (1943).
[2] Cf. in particular Garegnani (1978-9), (1992), (1998) Trezzini (1995), (1998).
[3] One of the present authors deals with the question in a companion paper Trezzini (2005).

pose. Thus, though our argument regards the long period in which productive capacity can change, we shall not be concerned with how much of the expansion of output in each boom comes from new capacity rather than from previously under-utilised capacity.

2. Some elementary assumptions will be made for the sake of the clarity of the argument. Technical progress will be left aside, and we shall assume constant returns to scale and no scarce natural resources. We shall have to operate with value aggregates: and in order to clear the ground for that, we shall also assume a given real wage, and the corresponding system of competitive normal prices. The growth of the economy will not then affect *relative prices* and we may therefore unambiguously measure our value magnitudes in terms of any numeraire (we are not concerned here with the level of money prices, which may, if we so suppose, rise in the booms and fall, or rise less in the slumps, leaving *relative* normal prices broadly unaffected). Investment will be taken gross in the usual sense and the same will therefore be the case for savings and the social product. We shall assume that labour is indefinitely available in the long run. Finally, we shall ignore the effects of Government and international economic relations.

It should be stressed that while all the above assumptions will help to give simplicity and definiteness to the argument, the broad conclusions we shall reach are independent of them, except for the availability of labour.

3. We may begin by assuming that investment remains constant in its average level calculated over booms and slumps. It is an unrealistic assumption for an economy which we shall conclude has *then* to grow, but it will help to clarify that the growth has nothing to do with any increase in the average level of investment. To simplify further we may also suppose that cycles are of equal duration and that, cycle after cycle, constant average investment is distributed in the same way over the different phases of the cycle.

In Figure 1 we now find the usual Keynesian diagram with its 45° line, where on the horizontal axis we measure the social product in terms of one commodity chosen as numeraire, and on the vertical axis the corresponding aggregate demand, analyzed in its components. We may now draw the two straight lines BB', SS', parallel to the 45° degree line. As we shall see, these lines are *not* consumption functions; they indicate the limits within which consumption will oscillate during the cycle. Thus, the vertical distance between the lower line BB', and the 45° line, *i.e.* the segment *bb'*, measures the highest amount which we assume investment to reach at the peak of each business cycle when, therefore, investment is actually equal to *bb'* and aggregate consumption must lie *on the BB' line.*

Similarly the distance between the upper SS' line and the 45° line — the segment *ss'* — is equal to the level which investment reaches at the trough of each cycle, with the aggregate consumption at the point in time lying *on the SS' line.*

The segments bs, sb_1, b_1s_1, s_1b_2 etc. also indicated in the diagram show instead the path of consumption in the economy, *i.e.* are assumed to be segments of the actual consumption functions, which change in passing from slump to boom, and from cycle to cycle.

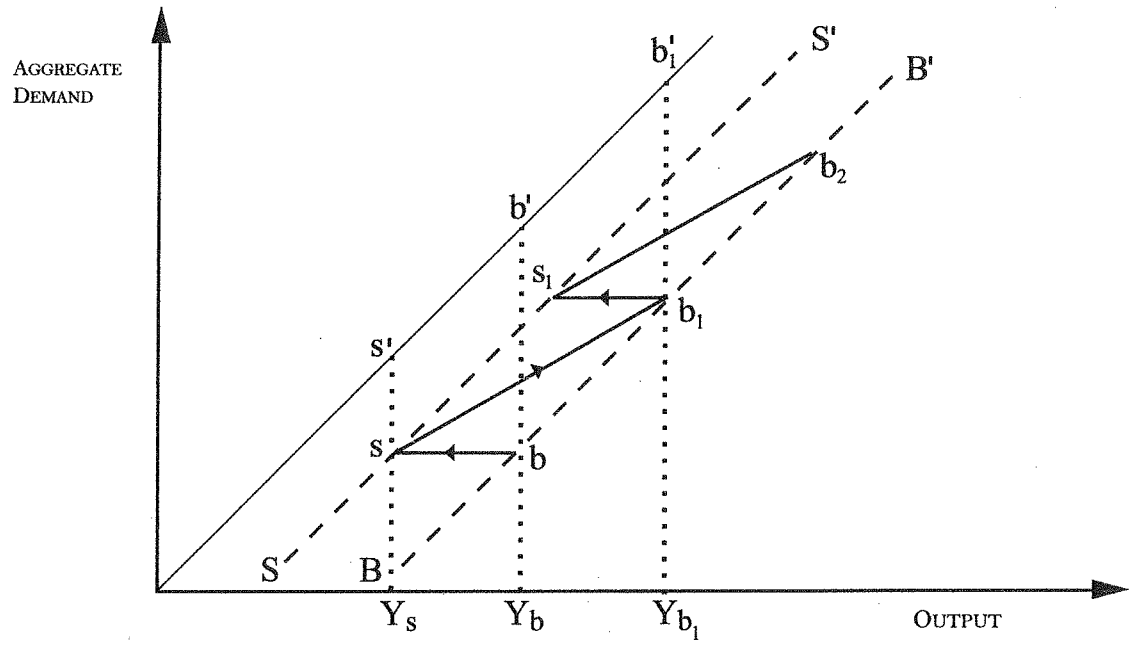

Figure 1. The trajectory b, s, b_1, s_1, b_2 indicates the path of the aggregate consumption when investment fluctuates around an average constant level.

4. Let us then start from point b representing consumption at the peak of the boom with which the previous cycle has just ended. Point b, which must lie on BB', opens Cycle 1. Investment then starts to contract from bb' to ss' generating a recession: consumption moves in the direction of the arrow along the segment bs, with the low marginal propensity to consume (which we have here supposed to be zero for simplicity) shown by the slope of bs, with s accordingly indicating consumption at the trough of Cycle 1. Investment then startes increasing again and a new expansion starts which reaches its peak when consumption has reached b_1, after moving along the segment sb_1 whose essential characteristic for us is its slope higher than that of bs showing, that is, a marginal propensity to consume higher in the boom than that of the preceding slump.

At b_1 another cycle, Cycle 2, may then start with its recession and boom (see points s_1 and b_2), but we have already reached our main conclusion. By assumption at the peak b_1 at which Cycle 1 terminates and at peak b at which it began, investment is of the same amount bb': income however has increased from Y_b to Y_{b1}. It is clearly (i) the difference between the marginal propensity to consume in the slump and that of the ensuing boom, (the difference between the slopes of bs and tht of sb_1); and (ii) the oscillation of the investment, that have jointly engendered the increase in income.

5. It may be easily seen, on the other hand, how the expansionary effect of those two factors is enhanced when the (average) level of investment increases cycle after cycle, *e.g.* by keeping on average a more realistic constant proportion to the social product thus also resulting in a constant proportion of consumption. This can be illustrated by indicating with β the proportion of consumption at its minimum (at the peak of this cycle) and by σ the analogous proportion at its maximum, *i.e.* at the trough of the cycle: the *SS'* and *BB'* lines would now leave the origin of the axes with slopes β and σ respectively, as shown in Figure 2. It may then be seen that, over each cycle — *i.e.* as we have assumed, over the same period of time — income will undergo a further increase ($Y_{b1} - Y_a$) with respect to the case of a constant average investment,[4] owing to the lengthening ab_1, of the segment representing the boom consumption function sb_1. The dimension of the corresponding further increase in income depends exclusively, we may note, on the boom propensity to save (1-β) applied to the increment in the investment experienced from peak *b* to the peak b_1.

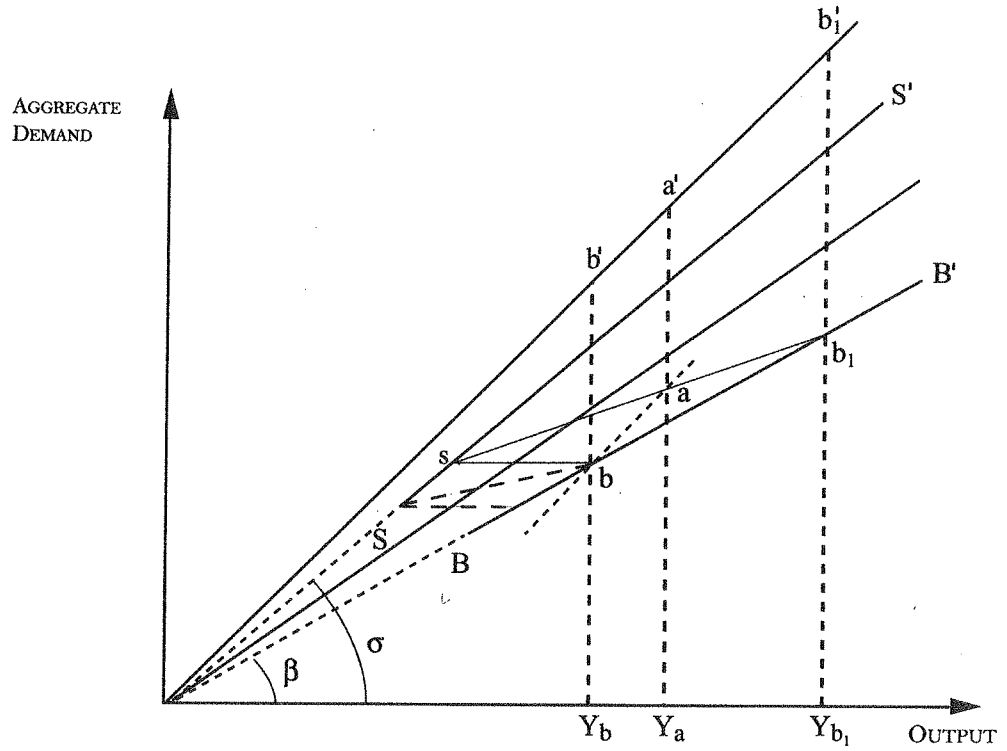

Figure 2. The trajectory *b, s,* b_1 indicates the path of aggregate consumption when investment is on average proportional to the social product; the segment ab_1 indicates the part of that path due to the increment of investment from Cycle 1 to Cycle 2, and $Y_a Y_{b1}$ the corresponding addition to the social product.

We may also see that the expansionary effect of the investment fluctuations would persist even if the investment fluctuations took place around a *decreasing*

[4] In Figure 2, at Y_a the income would have reached its peak if peak investment had remained the same as in the previous cycle.

trend of it. In this case the two lines BB' and SS' would converge towards the 45° line as in Figure 3. As shown in Figure 3 two cases are then possible. In the first, notwithstanding the decrease of the average level of investment, the difference between the two marginal propensities to save is still sufficient to generate a net expansion of income (Figure 3A). In the second case, investment decreases so sharply from one peak to the next, that the second peak occurs, at an income level lower than that for the first, despite the opposite tendency due to the boom consumption function diverging upwards from that of the previous slump (Figure 3B). In this second case the expansionary effect of the difference between the two marginal propensities is still there, but it is more than offset by the drastic fall in peak investment.

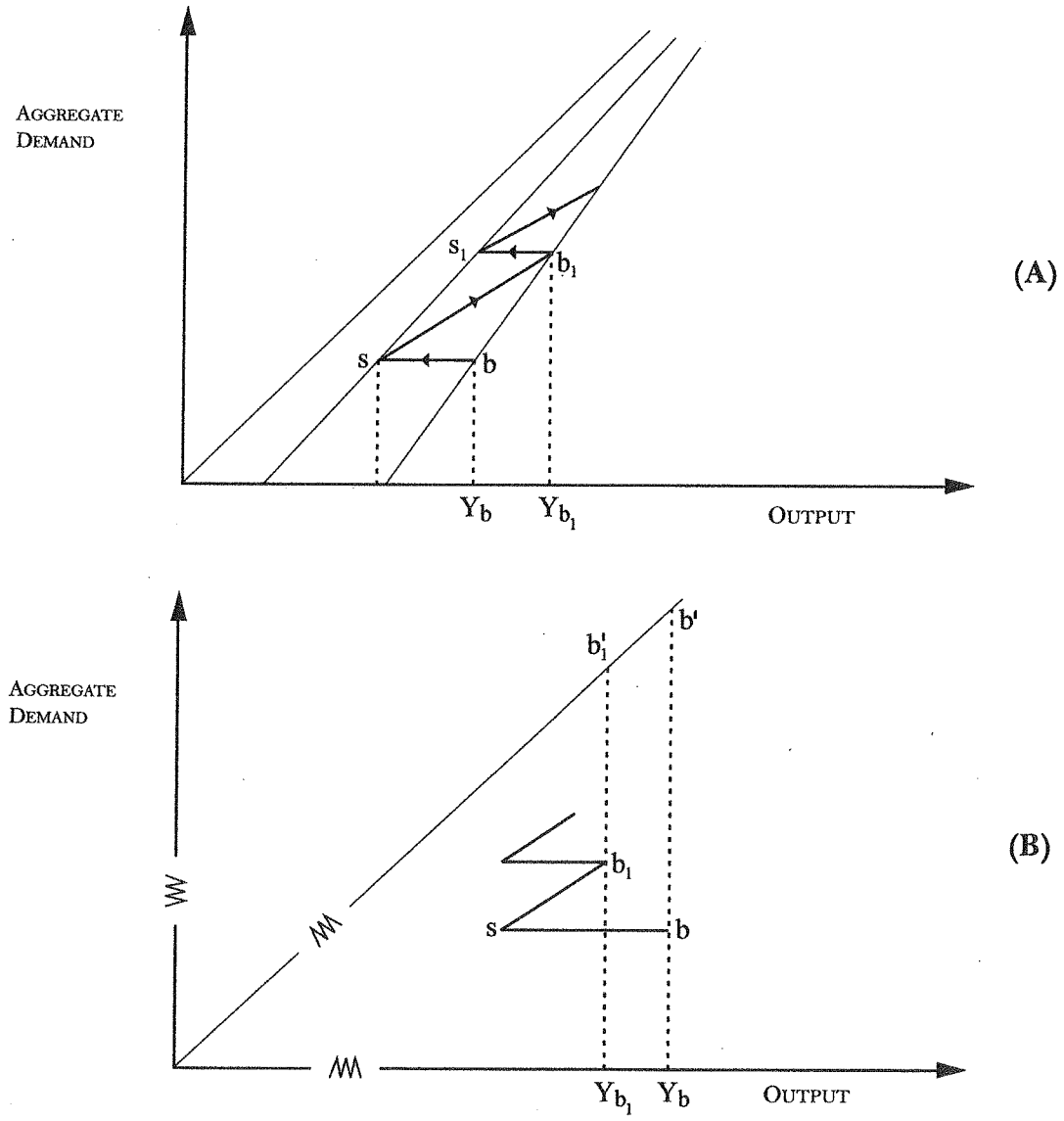

Figure 3. A decreasing trend in average investment would not generally prevent aggregate demand from expanding because of the oscillation in investment and social product (see Fig. A). However a drastic fall in boom investment from bb' to $b_1b'_1$ can more than compensate the expansionary effect of the oscillation, and boom social product accordingly falls from Y_b to Y_{b1} over the cycle (Fig. B).

We may on the other hand note that if the difference between the two marginal propensities were reversed, and *e.g.* in Figure 1 the highest segment $b_2\, s_1$ had arrows reversed and represented a slump from b_2 to s_1, with b_1 as the ensuing peak, then the mere oscillation of investment would cause the income *to fall* from Y_{b2} to Y_{b1} between the two peaks, and this, despite the assumed constancy of investment.

6. What we have seen above is essentially a process by which, thanks to irreversibilities in consumption, the oscillations of investment and social product in the course of the trade cycle trigger successive shifts in the propensities to consume which, then result in raising the community's consumption function from bs to $b_1 s_1$ or from sb_1 to $s_1 b_2$ etc, thus tending to raise the social product with it.[5] The idea is simple, and the assumptions on consumption behaviour during the cycle are, as we said, far from original. It may therefore seem surprising that the above result should not have emerged in the literature with any clarity before. However its emergence would have required two conditions which have not been generally fulfilled.

The first condition is a rejection of the notion of a long-period tendency of the competitive economy towards the full utilization of productive resources: the idea here expounded clearly rests on the *long-period*, as well as short period, *elasticity* of outputs in the face of changes in aggregate demand. (It should be noted that this long run elasticity is largely based on the fact that increases in aggregate demand can be met by compound-rate potential increases in productive capacity).[6]

But the second condition also concerns those authors who are ready to grant aggregate demand an independent role in the growth of the economy. It is that the analysis of capital accumulation should be conducted in terms of the traditional normal positions of the economy, compatible as such with *any* pattern in the evolution of outputs, and not only in terms of steady growth which obscure important phenomena like those considered above.

7. A final word of warning may be useful at this point. As implied in par. 2 what is presented here is not meant to be a "model of growth". Its purpose is the more modest one of pointing out an element which can play a role, perhaps a considerable role, in the growth of a market economy. Indeed, we do not believe that attempts at a formalised overall explanations of the growth of an economy can be usefully pursued at a general theoretical level. Once we abandon the view that growth can be fully explained in terms of autonomous changes in factor endowments, technical knowledge or tastes, then the importance of institution-

[5] This explanation of growth is as *endogenous* as trade cycles are.

[6] See Garegnani (1992) for an analysis of the relevance of this elasticity in the analysis of long run tendencies.

al circumstances in the process of growth is imposed as it was for the classical economists. And those circumstances are too complex and too variable from country to country and period to period in the same country, to be put in a strait jacket of assumtions simple and general enough to allow for a useful deductive quantitative treatment of the process as a whole, as distinct from the elucidation of particular aspects of it.

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