CENTRO DI RICERCHE E DOCUMENTAZIONE
"PIERO SRAFFA"

UNIVERSITÀ DEGLI STUDI ROMA TRE

THE IRREVERSIBILITY OF CONSUMPTION AND ECONOMIC GROWTH

Attilio Trezzini

Quaderno di Ricerca n. 6
2005

ARACNE

Quaderni di ricerca della Fondazione "Centro di Ricerche e Documentazione Piero Sraffa"

Dipartimento di Economia
Via Ostiense 139 – 00154 Roma
Telefono 06/57374037
e–mail: sraffa@uniroma3.it

Comitato Scientifico

— I *Quaderni di Ricerca* della Fondazione "Centro di Ricerche e Documentazione Piero Sraffa" si propongono di promuovere ricerche indirizzate verso la ricostruzione dell'economia politica lungo le linee dell'impostazione degli economisti classici riportata alla luce e sviluppata da Sraffa; di offrire una sede di discussione nella quale i risultati raggiunti dalle diverse correnti critiche possano essere confrontati fra loro e con quelli della teoria economica ortodossa; di stimolare lo studio di concrete realtà economiche, e di restituire alla spregiudicata osservazione dei fatti quel ruolo centrale che essa è necessariamente chiamata a svolgere in ogni costruzione scientifica.

— Il Comitato Scientifico decide circa la pubblicazione di lavori nella collana dei *Quaderni di Ricerca* della Fondazione Sraffa sulla base del parere di referees. Il Comitato Scientifico dei Quaderni può anche decidere la ristampa di materiali già pubblicati.

— Il Comitato Scientifico dei *Quaderni di Ricerca* è costituito da due membri del Consiglio della Fondazione "Centro di Ricerche e Documentazione Piero Sraffa", nonché da studiosi esterni nominati dal Consiglio.

— I Quaderni di Ricerca sono depositati come opere a stampa secondo gli obblighi previsti dall'Art. 1 del D.L.L. 31.8.45 n. 660. I Quaderni vengono inviati a studiosi, a istituzioni universitarie e a centri di ricerca interessati.

06 93781065
info@aracneeditrice.it
www.aracneeditrice.it

redazione via R. Garofalo, 133 a–b
00173 Roma
amministrazione via Gramsci, 264, pal. 6
00040 Lanuvio (RM)

ISSN 1722-5604
ISBN 88-548-0093-7

I edizione: maggio 2005

Finito di stampare nel mese di maggio del 2005
dalla tipografia « Eccigraphica S.r.l.» di Roma
per conto della « Aracne editrice S.r.l. » di Roma

CENTRO DI RICERCHE E DOCUMENTAZIONE
"PIERO SRAFFA"

UNIVERSITÀ DEGLI STUDI ROMA TRE

THE IRREVERSIBILITY OF CONSUMPTION AND ECONOMIC GROWTH

Attilio Trezzini

Quaderno di Ricerca n. 6
2005

ARACNE

Abstract of the paper

The thesis put forward in a previous paper by P. Garegnani and the author is here scrutinized in detail. In advanced capitalist economies the asymmetry of aggregate consumption, which decreases to a lesser extent during recessions than it increases during expansions, implies an endogenous source of growth and accumulation. The analysis is developed here in terms of different numerical and graphical examples. The connection with similar assumptions on consumption to be found in the literature is also examined and some implications of the hypothesis in relation to the meaning of the proportion of saving in income are pointed out.

THE IRREVERSIBILITY OF CONSUMPTION AND ECONOMIC GROWTH

A. Trezzini*

1. Introduction

The way in which aggregate consumption changes with aggregate income in advanced capitalist economies in the presence of cyclical fluctuations implies an endogenous source of growth and accumulation. This thesis rests on two simple assumptions. The first is that the marginal propensity to consume is lower in the course of a cycle when income contracts than when it increases. The second is so intrinsically plausible as to be more a statement of fact than an assumption, namely that investment fluctuates and generates income fluctuations.

P. Garegnani and I put this thesis forward in a recent paper,[1] where it was presented in bare outline and using only graphical representations of the process theorised. The present paper undertakes a more extended presentation of the same thesis and a detailed examination of some connected points. Since the inspiration for the assumption on consumption was initially drawn from a well–known debate of the 1940s, Section 2 of the present paper provides an overview of its rationale. The thesis is then presented with the use of numerical examples, an extremely simple one being developed in Section 3, where it is assumed that investment oscillates cyclically around a constant trend level. Section 4 introduces a slight modification to the example by assuming that investment tends to grow with the expansion of aggregate demand.

Section 5 elucidates the relations between the general theoretical background adopted here and an understanding of the possible role of the irreversibility of consumption in the growth process. Section 6 discusses an origi-

* I am deeply indebted to P. Garegnani, with whom the core ideas of this paper were developed. This joint work produced what I refer to as the *companion paper*. While many of the differences in exposition, the references to the literature, and many implications of the central idea distinguishing this paper from the previous one have been widely discussed with Prof. Garegnani, he bears no direct responsibility for them. Different forms of the same paper have been presented in the *First Brazilian Conference on the Surplus Approach*, held in Salvador de Bahia in October 2002, at seminars in various Italian universities, and at the *Effective Demand and Economic Growth Workshop* held in Sydney University in November 2004. The list of colleagues who have made valuable comments during these presentations would be far too long for individual acknowledgement. Special thanks do go, however, to F. Serrano, A. Palumbo, F. Vianello, F. Petri, R. Ciccone, T. Aspromourgos and G. White, who provided comments that improved this work through each version. The usual disclaimer applies.

[1] P. Garegnani and A. Trezzini (2005) "Cycles and Growth: A Note on Development in a Market Economy" *Quaderno di Ricerca n. 5 Centro Studi e Documentazione "Piero Sraffa"*, Roma.

nal implication of the analysis, namely that the proportion of saving in income is independent of individual or institutional choices of saving and consumption. Finally, Section 7 provides a detailed discussion of the instrumental role of the numerical examples as differing radically from the role generally attributed to "models of growth".

2. The rationale of the assumption on consumption behaviour

The basic assumption on consumption is that consumers tend to maintain their acquired standards of consumption, especially over a limited period of time. Their expenditure thus tends to be inelastic with respect to reductions in their level of income. On the other hand, consumers readily tend to increase their expenditure when their income rises. In the course of a cycle, the marginal propensity to consume is thus lower when income contracts than when it increases. During booms, consumers tend to acquire new and higher standards of consumption irreversibly.

The theoretical rationale of this assumed behaviour of aggregate consumption is to be found in recognition of the social value that households attach to their consumption expenditure. Above a very low level of affluence, the enjoyment of goods cannot be regarded as intrinsic, as it is in traditional economics. Individuals tend to consume goods enabling them, by virtue of their visibility, to be socially identified with a specific group. As consumption expenditure provides individuals with a coveted status symbol, it is very unlikely to be reduced readily when there is a drop in disposable income. While consumption tends to increase more or less readily when income rises, it proves to be much more inelastic with respect to decreases in income.

The idea that consumption is to be seen as a social phenomenon stretches back a very long way, being certainly identifiable in embryonic form in Mandeville and in some passages by the Classical economists. An almost complete statement of what could be called a theoretical approach to the analysis of consumption, offering a clear view of this asymmetry, is to be found in T. Veblen (1899). The same approach was assumed and developed in the works of the US economists, mostly women, who developed theoretical, historical and empirical works during the 1920s along the lines indicated by Veblen.[2]

The main lines of this approach to the analysis of consumption were finally utilised during the 1940s when its popularity reached a peak with the theoretical debate prompted by the contrast emerging in empirical works between the variability of the average propensity to consume during the cycle and its alleged constancy over long stretches of time.

Certain econometric works introduced the ideas of an increasing standard of

[2] An analysis of the origin and early phases of this approach is provided in Trezzini, A. (2005).

consumption or the asymmetry of the marginal propensity to consume simply as formal attempts to explain what was considered an empirical problem.[3]

Major economists such as Samuelson (1943), Duesenberry (1948 and 1949) and Modigliani (1949) took up the issue and introduced a more closely argued analysis of these ideas. The asymmetry of consumption behaviour, which appeared highly plausible when changes in individual incomes were considered, was also justified at the aggregate level, i.e. when changes in aggregate output and income were taken into consideration.[4]

This approach also underwent a major transformation in the formulations of the 1940s, being employed in a theoretical framework where the principle of

[3] The most popular works are those by Smithies (1945), Mosak (1945), and Bennion (1946). See Thomas (1989) for a complete and accurate review of the econometric works on consumption function.

[4] Following Duesenberry (1949 p.86–89), it is possible to argue that the principles determining the asymmetry of consumption expenditure at the individual level are responsible for a similar asymmetry in *aggregate* consumption. Having explained the reasons that cause individuals to behave asymmetrically, Duesenberry analyses the groups that can always do so during the cycle's fluctuation, those that can do so for limited periods of time, and those forced to behave symmetrically. Changes in aggregate income during the cycle are due to changes in labour income and in 'property income'. Profit and rent earners are generally in the highest percentiles of income distribution and, as such, the groups that account for the bulk of saving. It is not difficult to imagine that these groups will continue to consume during recessions, even over many years, at approximately the same levels as during expansion. Most worker households can be unaffected by recession. If they do not lose their jobs, their salaries tend to remain constant. Among those who do lose their jobs, an important initial distinction can be drawn between partial and total loss. While partial loss of labour income can assume many different forms, the individuals affected generally tend to maintain their acquired standards of consumption — at least partially — either by reducing positive savings or by running up a deficit (reducing accumulated wealth or getting into debt). The case of workers who lose employment completely but are members of families in which other members do not is similar to the partial loss of labour income. During recessions, however, many worker households do lose their jobs and their labour incomes completely. It is from this group that symmetrical behaviour (a reduction of consumption proportional to the reduction in income) can be expected. These families will tend to incur deficits in the initial period of unemployment but if it lasts sufficiently long they will be forced to adjust to the new situation and probably balance their budgets, in which benefits are the main source of income. Some of them are those destined to become long–run unemployed, losing their jobs and never obtaining steady employment again until a high level of prosperity is reached. Not all the people who will eventually constitute the 'hard core' of unemployment get there at once. At any time during the recession, there is thus always a certain number of unemployed families going through the first stage of unemployment and trying to defend their standards. During recessions there is, however, also a part of unemployment that is widely spread, so that a large number of workers take turns being unemployed. These workers experience only the initial phase of the reduction of labour income. The comparative inelasticity of consumption with respect to income decreases must obviously be considered more significant the shorter the recession. It is reasonable to assume that the influence of past higher levels of income will eventually fade away during a very long recession or the century–long decline of an economy. In conclusion, many groups of consumers are therefore probably able to avoid contracting their consumption during recessions to the same degree as

effective demand was used to account for cyclical fluctuations and the assumption of full employment to analyse the trend of the economy. Though supplanted in macroeconomic analysis since the 1950s by others that are more extensively in line with traditional assumptions, it still survives in many different fields of analysis that are, however, less connected with economic growth.[5]

3. The theoretical background and the first numerical example

The failure to recognise the implications of the asymmetry of consumption with respect to growth is essentially due to the general theoretical context in which those plausible assumptions were used. This paper assumes a theoretical viewpoint in which aggregate demand and its evolution in time are understood as playing a crucial role in the growth process, being in fact taken as the primary factors determining the level and expansion of output and income. Productive capacity is also seen as determined in its level and its development in time by the expansion of aggregate demand.[6]

It has been shown that the *elasticity* of long–run output with respect to changes in aggregate demand is a crucial factor if aggregate demand is to play its leading role in the process of growth.[7] We shall therefore not assume steady–state conditions, which necessarily conflict with this elasticity and prevent a full understanding of the significance of the irreversibility of consumption, but endeavour on the contrary to assume no specific limit to this elasticity. The importance of the theoretical context in which the present analysis is to be developed is addressed once again in Section 5.

Two different numerical examples will now be developed in order to show the possible role played by the irreversibility of consumption in the growth process. These examples are designed to explain at greater length the basic principles developed in the companion paper.

For the sake of clarity and simplicity, technical progress will be ignored and

they expand it during expansion. Only some groups of consumers could be forced to behave symmetrically. While it is possible that recessions tend to hit a higher proportion of such groups, they are very unlikely to affect *only* these groups. It is only in this case that the asymmetry of aggregate consumption would fail to manifest itself.

[5] See Galbraith (1958) and Levine (1998). The relationship between this approach to consumption and economic growth is addressed in Gualerzi (2001).

[6] The approach to growth and accumulation adopted here was originally put forward by Garegnani (1962) and has been developed more recently in different works, e.g. Ciccone (1986), Kurz, H. (1990), Garegnani (1992), Serrano (1995), Trezzini (1995, 1998), Vianello (1996), Garegnani and Palumbo (1998).

[7] As shown in Garegnani (1992), this elasticity is largely based on the fact that increases in demand can generally be met, in the long run, by compound–rate potential increases in productive capacity.

we shall assume constant returns to scale with no scarce natural resources. In order to measure the value aggregates operated with unambiguously, we shall also assume a given real wage and the corresponding system of competitive normal prices. The growth of the economy will not affect relative prices.[8] Investment, savings and the social product will be taken as gross. Labour is indefinitely available in the long run. Finally, we shall ignore the effects of government and international economic relations. While all the above assumptions will obviously help to make the argument as simple and concrete as possible, the broad conclusions drawn are independent of them.

The two basic theoretical assumptions upon which the thesis actually depends are those already stated in the introduction, namely the irreversibility of consumption and the simple fact that investment fluctuates.

The assumption on consumption made here can be formalised by positing that aggregate consumption is, in each period of time, determined by the sum of two components. The first is expenditure for the "acquired" standard of consumption, the level of which depends on past levels of income. The simplest formulation involves positing that this part of consumption is equal to the level of aggregate consumption in the previous period. The second component of aggregate consumption depends on the current level of income and in particular, it is assumed, on the difference between current income and that of the previous period. The asymmetry of consumption behaviour is represented by postulating that during periods of expansion the marginal propensity to consume assumes a value, α^e, higher than the value, α^r, that it assumes during recessions ($\alpha^e > \alpha^r$).

Aggregate consumption is thus determined in each period as

$$C_t = C_{t-1} + \alpha^\theta (Y_t - Y_{t-1}) \qquad [1]$$

where

C_t, C_{t-1} = aggregate consumption of the periods t, t-1, etc.

Y_t; Y_{t-1} = income levels of the periods t, t-1, etc.

α^θ = marginal propensity to consume in periods of recession in cases where $\theta = r$ and in periods of expansion in cases where $\theta = e$.[9]

[8] We are not concerned here with the level of money prices, which can be assumed to rise in booms and fall or rise to a lesser degree in slumps, leaving *relative* normal prices broadly unaffected.

[9] The formalisation of the asymmetry of consumption behaviour chosen here could certainly appear extreme. In particular, assuming a higher marginal propensity to consume during the whole phase of expansion means that consumption starts to increase as soon as income starts to recover. It is thus assumed that during a recession households get used to associating the acquired standard of consumption — or the part they continue to consume — with their lower levels of income and then increase their consumption as income starts to rise. The level of consumption corresponding to a given level of income during a recession thus differs both from the level of consumption corresponding to the same level of income attained during the preceding boom and from that corresponding to the same level of income attained during the following recovery. This

The second hypothesis is that the level of investment fluctuates. Here we assume that investment fluctuates regularly around a constant level during the business cycle. In other words, it is assumed that the economy is in a stationary condition and that the replacement of existing capital occurs cyclically but, for the sake of simplicity, in a regular pattern. It is posited that the cycles last 10 years — a one–year peak, four years of recession, a one–year trough, and four years of expansion — and that the level of gross investment during the cycles varies from 30 at the peaks to 10 in the troughs with an average level of 20. (Table 1a of the Appendix gives the numerical values assumed for the levels of investment corresponding to different periods of the cycle.)

These given levels of investment and the relation [1] determining the level of consumption are elements sufficient to determine income, consumption and investment in a numerical example representing some business cycles. The figure of 100 is assumed for the level of income of an initial peak period, during which, according to our assumption, investment is equal to 30.[10] Since investment and consumption alone are assumed to exist, consumption is necessarily 70 during the same period. As from the second period (the first period of recession), income is given by

may conflict with two plausible alternative assumptions that do not, however, appear particularly strong on closer examination. First, it can be assumed that once a household has reduced its accumulated wealth in order to maintain its standard of consumption during a recession, it will not expand consumption again until the accumulated wealth has reached its original level, or even a "desired proportion" with respect to current income. It can, however, be argued that the tendency to maintain acquired standards of consumption is essentially based on the *social visibility* of consumption, which determines a net bias towards consumption of the households. As its social visibility is much lower, accumulated wealth cannot generally play the same role. In deciding upon consumption expenditure, households regard the level of wealth or its proportion with respect to income as a secondary rather than primary target. The second plausible alternative is the assumption that once a household has maintained its standard of consumption during a recession, it will not expand consumption again until current income has reached some critical level, perhaps the highest level previously attained or something similar. This assumption might ultimately prove rigid and difficult to justify. It would in fact mean assuming that all individuals have a clear–cut level of the proportion of consumption in income that has to be reached before they start to increase consumption again. This would again imply that households take saving as a target of similar importance to that of consumption in determining their expenditure. Moreover, even if there were plausible arguments to assert the existence of this individual behaviour, it would be difficult to aggregate so as to generate an *aggregate* consumption function according to which consumption does not increase during recoveries until the highest level of income previously attained — or any other critical level — has been reached again. The question of how these assumptions could affect the primary results of the present analysis without, however, altering them substantially is discussed in fn. 17. It is obviously true that empirical analysis of aggregate consumption and the data on family budgets would greatly enhance our knowledge on this point and our understanding of the relevance of the different alternatives. Such empirical analysis is certainly a necessary step in the development of our argument.

[10] Readers accustomed to analyses based on "growth models" will probably view the assumption of an arbitrarily given initial level of income as a condition impairing the validity of our

$$Y_t = \frac{1}{1 - \alpha^{\theta}} \left[C_{t-1} - \alpha^{\theta} Y_{t-1} + I_t \right] \qquad [2]$$

where α^{θ} is $\alpha^e = 0.6$ during the expansions and peaks and $\alpha^r = 0.1$ during recessions and troughs.

Figure 1a shows the fluctuations in the level of gross investment during the business cycles and the corresponding fluctuations in income and consumption.[11] While investment fluctuates around a constant level, both income and consumption fluctuate around increasing trends.

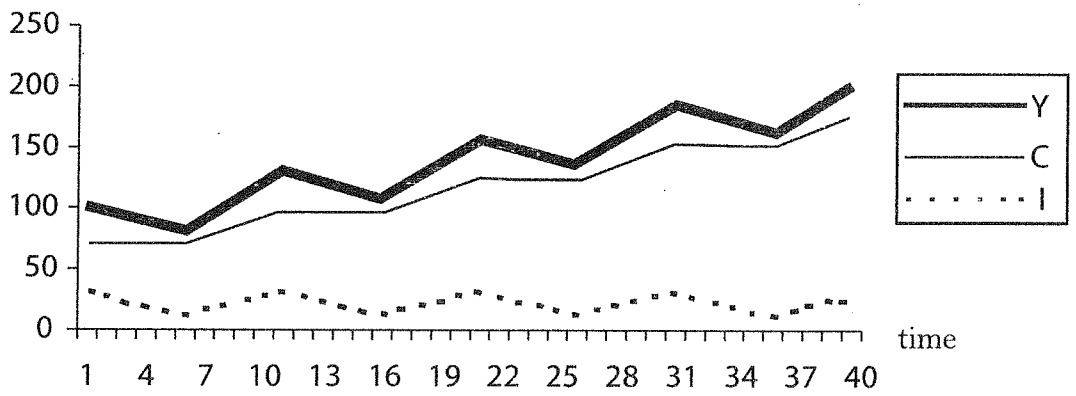

Figure 1a. Evolution in time of gross investment, income and consumption on the assumptions of an asymmetric marginal propensity to consume during the business cycles ($\alpha^e = 0.6$; $\alpha^r = 0.1$) and a constant average level of investment

An analogous numerical example has been developed on the assumption that the marginal propensity to consume is constant over the business cycle, i.e. by positing $\alpha^e = \alpha^r = 0.5$. As a result of this simple modification, the same investment levels are associated with radically different behaviour for income and consumption. These aggregates show fluctuations around a constant trend (see figure 1b).[12]

analysis. This initial condition may appear to leave a large part of the growth process unexplained, i.e. the level of the trend of income could be considered dependent on this initial condition. The difficulty of solving the example *backward* can be regarded as the analytical aspect of this weakness. The numerical examples we use here, as distinct from the "models of growth", are not required to account for the growth process completely. Showing that our assumptions are sufficient to determine positive growth starting from an initial condition seems to be sufficient to prove our thesis.

[11] Table 1a in the appendix shows the income, consumption and investment levels for a period of four business cycles.

[12] Table 1b in the appendix presents the numerical values of income consumption and investment levels for this case.

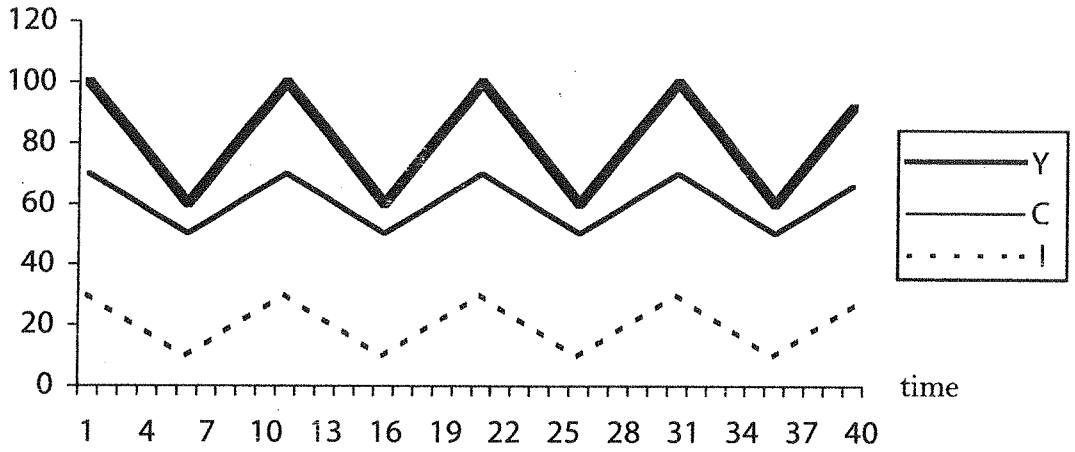

Figure 1b. Evolution in time of gross investment, income and consumption on the assumption of a constant marginal propensity to consume during business cycles ($\alpha^e = \alpha^r; = 0.5$) and a constant average level of investment

The irreversibility of consumption, represented here by the difference in marginal propensities to consume during the different phases of the business cycles, is capable of determining an overall endogenous stimulus for the growth of aggregate demand and output.

The case with asymmetric propensities, $\alpha^e > \alpha^r$, can be graphically represented in the well–known Keynesian diagram with a 45° line, thus obtaining Figure 1c (which is essentially Figure 1 of the companion paper[13]). Output and income are measured on the horizontal axes and aggregate demand and its components on the vertical. The two lines, SS' and BB', drawn on the same diagram have a purely instrumental role. Both are parallel to the 45° line. The vertical distance between BB' and the 45° line, i.e. the segment *aa'*, measures the amount reached by investment on our assumptions at the high points of its fluctuation, i.e. during all the peaks of the cycles. Investment is thus equal to *aa'* in any peak period of the cycles and aggregate consumption therefore lies on BB'. Similarly, the segment *bb'* measures the level reached by investment, in our hypotheses, in the lower points of its fluctuation. In any trough period, aggregate consumption lies on SS'.

Point *a* identifies consumption and income in the peak opening Cycle 1. Y_a is the corresponding level of output and income of the period. Investment starts to contract in the following period and income to decrease. Consumption contracts along the segment *ab* during the first recession with the low marginal propensity to consume $\alpha^r = 0.1$ shown by the low slope of segment. The recession of Cycle 1 ends in *b*, when investment has reached its lowest level and income is equal to Y_b.

[13] The only difference with respect to the figure in the companion paper is that this example assumes a marginal propensity to consume $\alpha^r = 0.1$ and the segments representing consumption during the recession have a slight slope, whereas it is assumed in the companion paper that $\alpha^r = 0$ and the corresponding segments are perfectly horizontal.

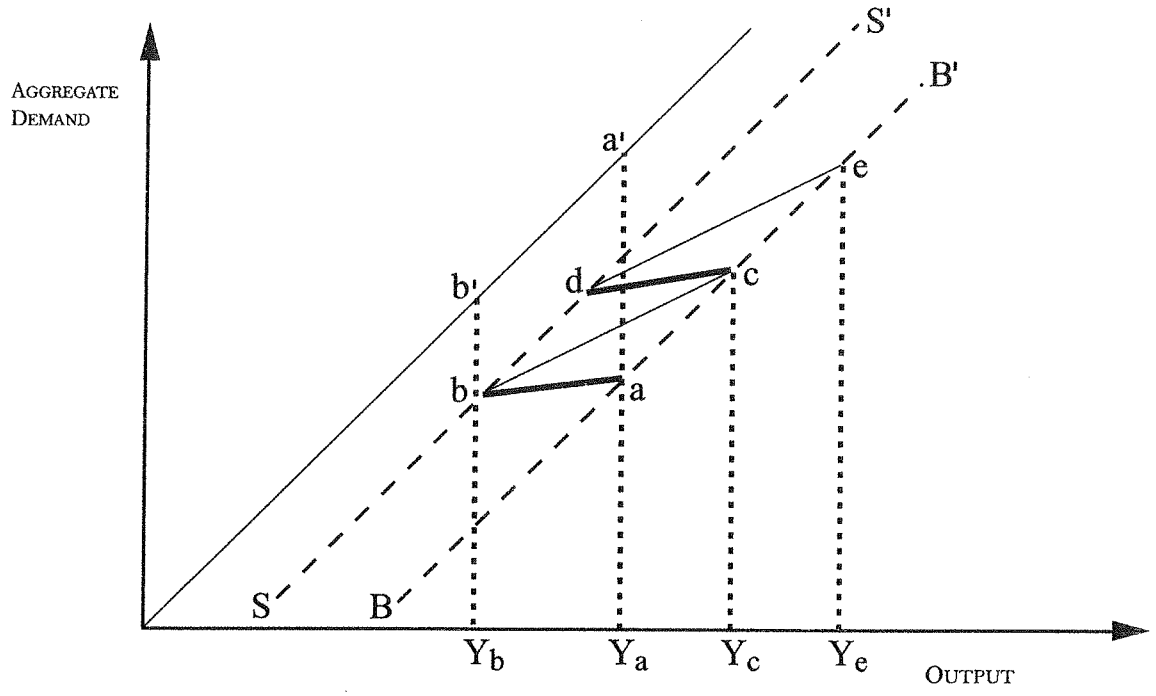

Figure 1c. Aggregate demand, gross investment consumption and income on the assumption of asymmetric propensities to save and constant average level of investment

A new expansion starts at point *b* with a rise in investment and income. The boom then peaks when consumption has reached *c*, moving along the segment *bc*, characterised by a marginal propensity to consume, α^e=0.6, which is higher than the one in the slump. At point *c*, investment has reached its peak level, aggregate consumption lies once again on BB', and income is Y_c. Another cycle, Cycle 2, can then start with its recession.

While the investment level is the same by assumption at the peak of Cycle 1 and at the following peak opening Cycle 2, income has increased from Y_a to Y_c. This growth is clearly entirely determined by just two elements, namely the difference between the marginal propensity to consume of the slump and that of the boom and the fluctuation of investment engendering the business cycle.

This process could clearly continue, in principle, for the following business cycles with consumption moving along the zigzag line and income increasing cycle after cycle.

4. A slightly more complex numerical example

The increase in production described above would never be attained solely through an increase in the utilisation of a productive capacity that, in this first example, is assumed to be essentially constant. This pressure on existing productive capacity would probably generate an inducement to invest and accumulate.

The assumption that investment depends on the expansion of aggregate demand can now be introduced in very general terms. We shall assume that the actual value of the *proportion* of investment out of income tends to fluctuate, attaining in each period a value γ^i lying between the maximum and minimum values γ^p and γ^t attained respectively during the peak periods and troughs.

This very general assumption implies that the investment level not only fluctuates cyclically but also changes on average with the changes in aggregate demand. Increases in the level of gross investment during periods of expansion determine increases in output. Because consumption varies less than proportionally with respect to income, increases in investment imply increases in the proportion of investment out of income. Symmetrically, the proportion of investment out of income tends to decrease during recessions.

At the same time, the assumption made here implies that when aggregate output tends to increase on average over the cycle, the average investment level tends to increase as well, thus creating increases in productive capacity. And when aggregate demand decreases or remains constant on average, the investment trend changes in the same direction.

Given our assumptions, the proportion of consumption in income, β, complements the proportion devoted to investment. It is therefore determined by the behaviour of the latter and fluctuates, assuming values of β^i between the maximum and minimum values β^t and β^p assumed respectively during the peaks and troughs.

As in the previous case, it is assumed that the marginal propensity to consume is $\alpha^e = 0.6$ during expansion and $\alpha^r = 0.1$ during recession. Cycles last ten years: a one–year peak, four years of recession, a one–year trough, and four years of expansion. It is then assumed that the *proportion* of gross investment in income fluctuates regularly between $\gamma^p = 0.3$ and $\gamma^t = 0.10$. (Table 2a of the Appendix shows the numerical values assumed for each of these proportions with respect to different periods of the cycle.) The proportion of consumption in income obviously fluctuates simultaneously between $\beta^p = 0.7$ and $\beta^t = 0.9$.

Consumption in each period can be determined on the basis of equation [1], where the marginal propensity to consume is determined in relation to the phase of the cycle.

The numerical example is developed by starting from the peak that opens the first cycle and assuming that the income for that period is $Y_1^p = 100$.[14] Given that the proportion of consumption out of income during peaks is $\beta^p = 0.7$, it is possible to determine consumption and investment of the same period as $C_1^p = 70$ and $I_1^p = 30$.

[14] Superscripts indicate the phase of the cycle: r = recession t = trough e = expansion p = peak; subscripts indicate respectively the cycle and the period inside the phase. Y_{12}^r is thus the income of the second period of recession of the first cycle.

In the following period, the first of recession of the first cycle, consumption, C^r_{11}, is

$$C^r_{11} = C^p_1 + \alpha^r (Y^r_{11} - Y^p_1) \qquad [3]$$

By expressing both income in the first period of recession, Y^r_{11}, and income in the previous peak period, Y^p_1, as the ratio between the level of consumption and the proportion of consumption out of income in the same period,[15] it is possible to transform equation [3] into

$$C^r_{11} \left[1 - (\alpha^r / \beta_1{}^r) \right] = C^p_1 \left[1 - (\alpha^r / \beta^p) \right] \qquad [4]$$

Substitution of the assumed numerical values for the parameters gives numerical values for consumption, income and investment of this period:

$C^r_{11} = 69.375$; $Y^r_{11} = 93.75$ and $I^r_{11} = 24.375$.

The evolution of income, consumption and investment can be determined for the subsequent periods by means of the same process with appropriate changes to the values of α^θ. (Table 2a in the appendix shows the numerical values for some hypothetical cycles.) Income and consumption fluctuate around increasing trends, as shown graphically in Figure 2a.

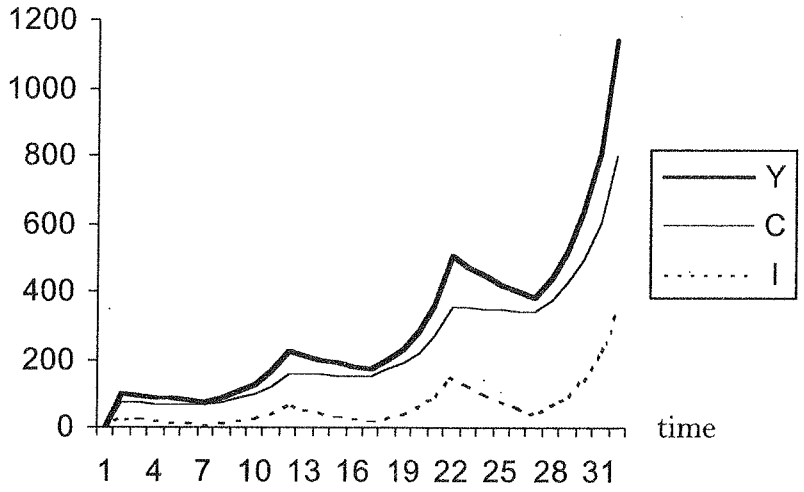

Figure 2a. Evolution in time of gross investment, income and consumption on the assumptions of asymmetric marginal propensities to consume ($\alpha^e = 0.6$; $\alpha^r = 0.1$) and investment fluctuating as a proportion of output

The irreversibility of consumption appears to be essential in determining the growth of output. Here, given the dependency of investment on the expansion of demand, this irreversibility also determines incentives for capital accumulation. The primary importance of the difference in the marginal propensities to consume can be shown by a numerical example retaining the same assumption on investment proportions and assuming a constant propensity to consume. Figure 2b shows the evolution of income, consumption and investment for $\alpha^e = \alpha^r = 0.5$. In the case of constant propensity to consume, all the variables fluctuate around constant trend levels.

[15] Positing $Y^r_{11} = C^r_{11}/\beta_1{}^r$ and $Y^p_1 = C^p_1/\beta$, which are true by definition.

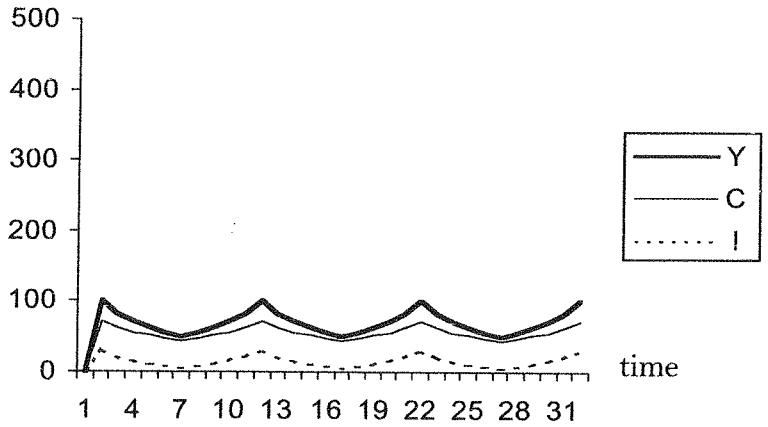

Figure 2b. Evolution in time of gross investment, income and consumption on the assumption of a constant marginal propensity to consume during the business cycles ($\alpha^c = \alpha^r = 0.5$) and investment fluctuating as a proportion of output

Finally, the results of this second example can be represented as before by means of the traditional Keynesian 45° degree diagram, Figure 2c. The lines SS' and BB' now develop from the origin of the axes. The vertical distance between BB' and the 45° line, *ai* or *c'i'*, still measures the level reached by investment during the peak periods. This level grows with the income level so as to maintain — as assumed — the same proportion with respect to income. The slope of BB' is determined by the proportions of investment in income attained during the peak periods, which are assumed to be equal to γ^p. This slope is equal to its complement β^p. In any peak period, investment is thus actually equal to the distance between the 45° line and BB' and aggregate consumption lies on BB'.

The same obviously holds true for SS'. Its slope is determined by the proportion of investment in income of the trough periods, γ^s, and it is equal to its complement β^t.

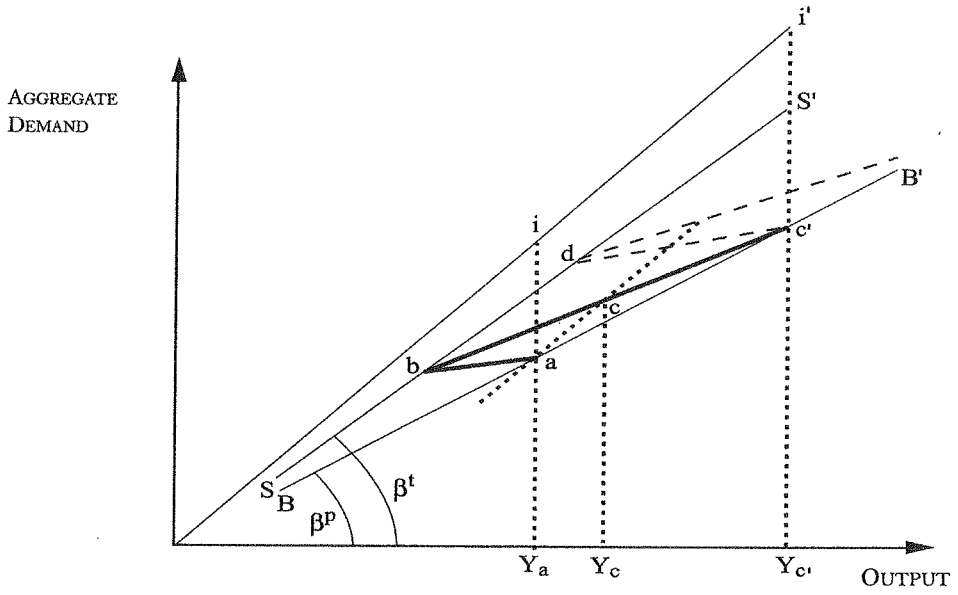

Figure 2c. Aggregate demand, gross investment consumption and income on the assumption of asymmetric propensities to save and investment changing with aggregate demand

Point *a* is a peak period and identifies the end of Cycle 0 and the beginning of Cycle 1. Investment and income then start to contract. Consumption decreases in accordance with the assumed low marginal propensity to consume during recessions, moving along the segment *ab*. The recession ends when consumption lies on SS', and is represented in particular by the point *b*. Trough investment is equal to the distance between *b* and the 45° line.

Expansion begins in the following period. Consumption starts to increase in accordance with a higher marginal propensity to consume and moves along the line *bc'*. The expansion ends when consumption has again reached BB' and investment is equal to *c'i'*. In this case, the increases in consumption and aggregate demand during periods of expansion also determine an increase in investment.

This is a *second indirect effect* of consumption expansion that generates a further increase in output and income. It is easy to show that if the peak level of investment were *constant*, the expansion would end at *c* and the peak level of output would be Yc. The second indirect effect of consumption expansion thus generates a further increase in income measured by the difference (Y_{t^1} - Y_p). The size of this further increase in income is exclusively determined by the propensity to consume of the peaks and by the increase in investment experienced from one peak to the next.

It is now possible to illustrate the effect of the asymmetry of consumption on growth and analyse some determinants of its scale. Consumption in the first trough of the first cycle, C_1^t, can be expressed as a function of the consumption of the previous peak opening the same cycle, C_1^p:

$$C_1^t = C_1^p + \alpha^r (Y_1^t - Y_1^p) \qquad [5]$$

By simple procedures we obtain

$$C_1^t [1 - (\alpha^r / \beta^t)] = C_1^p [1 - (\alpha^r / \beta^p)] \qquad [6]$$

As β^t is known, it is possible to express the level of income of the same trough, $Y_1 t$, as

$$Y_1^t = C_1^t / \beta^t \qquad [7]$$

The level of consumption at the peak of the second cycle, C_2^p, can also be expressed as a function of the consumption level in the trough of the first cycle, C_1^t:

$$C_2^p = C_1^t + \alpha^e (Y_2^p - Y_1^t) \qquad [8]$$

and therefore

$$C_2^p [1 - (\alpha^e / \beta^p)] = C_1^t [1 - (\alpha^e / \beta^t)] \qquad [9]$$

Given our assumptions, the ratio between two peak levels of income is equal to the ratio between two peak levels of consumption and can be used to determine the average rate of growth over the business cycle. This means that

$$Y_2^p / Y_1^p = C_2^p / C_1^p = (1+g)^n \qquad [10]$$

where *g* is the average rate of growth of income and consumption over the business cycle. The length of the business cycle is *n*. In our numerical example,

given the many assumptions of regularity and the assumed absence of any other source of growth, the rate *g* represents both the contribution of the irreversibility of consumption to economic growth and the overall rate of growth. Even though the rate *g* ceases to have this twofold meaning as soon as our simplifying assumptions are relaxed to any degree, it is still interesting to study its determinants in our simplified case. This helps to establish what circumstances can in general determine the size of the contribution made by the irreversibility of consumption to economic growth. By substituting [6] and [9] in equation [10] and rearranging the terms, we obtain

$$(1+g)^n = \frac{[\beta^p - \alpha^r]}{[\beta^t - \alpha^r]} \quad \frac{[\beta^t - \alpha^e]}{[\beta^p - \alpha^e]} \qquad [11]$$

From this equation it appears that

$\alpha^e = \alpha^r$ implies $(1+g)^t = 1$ and $g = 0$ [12]

while by simple procedures[16] it is possible to show that

$\alpha^r < \alpha^e$ implies $(1+g)^t > 1$ and $g > 0$ [13]

Given a constant pattern of fluctuation in investment, i.e. γ^s and γ^p, and the length of the phases of the cycle being equal, the contribution to economic growth deriving from the asymmetry of consumption *rises* in relation both to *increases* in the marginal propensity to consume during expansion, α^e, and to *decreases* in this marginal propensity during recession, α^r.

The intensity of the contribution to economic growth made by the irreversibility of consumption is affected in the numerical example by changes in the parameters β^p, β^t. It is, however, pointless to discuss the influence of these "parameters" without having first specified the meanings that they and our numerical examples assume in the theoretical framework presented here. Both these issues are addressed in the following sections.

[16] Given the equation
$(1+g)^n = [(\beta^p - \alpha^r) / (\beta^t - \alpha^r)] [(\beta^t - \alpha^e) / (\beta^p - \alpha^e)]$
for $g > 0$ it is necessary
$[(\beta^p - \alpha^r) / (\beta^t - \alpha^r)] [(\beta^t - \alpha^e) / (\beta^p - \alpha^e)] > 1$
which means
$(\beta^p - \alpha^r)(\beta^t - \alpha^e) > (\beta^t - \alpha^r)(\beta^p - \alpha^e)$
$\beta^p \beta^t - \alpha^e\beta^p - \alpha^r\beta^t + \alpha^e\alpha^r > \beta^t \beta^p - \beta^t \alpha^e - \alpha^r\beta^p + \alpha^e\alpha^r$
simplifying:
$- \alpha^e\beta^p - \alpha^r\beta^t > - \beta^p \alpha^r - \alpha^e\beta^t$ and rearranging:
$- \alpha^e\beta^p - \alpha^r\beta^t + \beta^p \alpha^r + \alpha^e\beta^t > 0$
$(\beta^t - \beta^p)(\alpha^e - \alpha^r) > 0$
Given that $(\beta^t - \beta^p) > 0$ by assumption, for $g > 0$ it is necessary that $(\alpha^e > \alpha^r)$.
Obviously $\alpha^r > \alpha^e$ implies $(1+g)^t < 1$ and $g < 0$

5. The asymmetry of consumption as a source of *endogenous* demand–led growth

Let us now generalise the results obtained. Due to the asymmetry of consumption, any transitory increase in output and income tends to generate a *permanent* — more or less substantial — increase in the level of consumption. The new level of irreversible consumption implies that the drop in output during recessions tends to be limited by a continuously rising "floor".

At the same time, it also implies that a component of aggregate demand — the part of consumption determined by acquired standards of consumption — tends to increase on average. Output and income therefore tend to increase. While this increase could be initially attained through over–utilisation of existing capacity, increases in consumption and output being persistent, they will generate a source of investment through which capacity tends to adjust demand.[17]

The irreversibility of consumption thus tends to generate a mechanism that causes the economy to grow and accumulate. This source of growth is exclusively due to fluctuations in income and irreversibility of consumption, and as such it is as *endogenous* as trade cycles are. This means that it does not depend on the growth of an 'autonomous' component of aggregate demand, which is determined exogenously with respect to the process whereby output and aggregate demand are determined. It is determined *endogenously* by the double–sided relation between consumption and income.[18]

[17] It is now possible to consider how the different formulations of the asymmetry of consumption considered in fn. 9 may affect our results. Let us consider the most plausible, according to which consumption does not start to increase during expansion until a critical level of income has been reached again. (The assumption that consumption does not expand until a critical level of wealth has been accumulated again can be discussed along the same lines.) Under our assumptions, we have argued that if the peak level of investment always remained the same cycle after cycle, asymmetric consumption behaviour would generate an endogenous source of growth. Under the alternative assumption, in order to generate an incentive to grow it is necessary for income to reach a level higher than any previously attained. It would thus be necessary at least for investment to fluctuate around a constant trend but with random fluctuations such that some peak level is higher than those attained before. In this case, the transitory and random peaks of investment and income would be transformed into persistent increases in consumption standards and aggregate demand and thus into a source of growth and accumulation. This difference does not impair the validity of our argument. We are studying a possible general mechanism that will never exist in reality with investment fluctuating around a constant trend. Our assumption of a constant trend level of investment tends to distinguish this effect logically from any other source of growth. Different formalisations of the asymmetry would affect the extent to which this logical possibility may come about but not the possibility in itself.

[18] The distinction between *autonomous* and *induced* components of aggregate demand has always been widely utilised in Keynesian contexts. This *autonomy* is generally considered with respect to the level of income and its variations. The distinction is certainly useful in studying the relationship — in both the short and the long run — between saving and investment and was in

As recalled in Section 2, the irreversibility of consumption has been assumed in the literature without the same conclusions being drawn. This can be accounted for entirely by the theoretical background of the present analysis, one feature of which in particular is crucial, namely the assumption of the long–run elasticity of output with respect to changes in aggregate demand. This is simply the analytical representation of the fact that aggregate demand plays a determining role not only in explaining cyclical fluctuations but also in determining long–run tendencies of the economy.

The elasticity of output with respect to changes in aggregate demand is clearly recognised in the second example, where an increase in aggregate demand originates an increase in output, initially obtained solely through changes in capacity utilisation and then through utilisation of the new capacity created as a result of the pressure of aggregate demand.[19] It is only by virtue of this elasticity that the increase in the average level of the standard of consumption causing an increase in aggregate demand can actually determine a lasting increase in output and an incentive to accumulate in real economies.

fact at the very basis of the Keynesian multiplier. In studying the growth process, however, it seems to be both far less clear and less useful. In the first place, it is less clear because it is in fact difficult to give a clear–cut definition of this 'autonomy'. It is, for example, difficult to argue that government expenditure or exports or technological investment can be determined with no reference whatsoever to present and past levels of income when the latter are understood in a long–run perspective as some sort of measure of an economy's development. The distinction between autonomous and induced components of aggregate demand is also less useful and may be misleading. From an analytical point of view, the use of this distinction leads in fact to the *autonomous* components being assigned a particularly important role in the growth process. Separate analysis could therefore determine an exogenous explanation of the trend of autonomous demand. There is thus a risk of the whole growth process being ultimately accounted for by (assumptions or) explanations that are exogenous with respect to the process of income determination. In our analysis this distinction is not assumed, and not only because our simplifying assumptions preclude the existence of most of the components of demand traditionally conceived as 'autonomous'. The distinction between autonomous and induced components of demand is actually rejected also with respect to consumption determination in which an autonomous component is frequently assumed. In considering a single period during the business cycle, we use a 'consumption function' that actually contains an 'autonomous' component independent of current income (and determined by the previous levels of consumption). On looking at the general process, however, we cannot regard this component as independent of the level of income and its variations. It is certainly not autonomous in the sense that it is explained independently of the process of output and income determination. Its evolution is, on the contrary, explained by the same process through which income and its evolution are determined period after period. We may thus conclude that while the distinction between autonomous and induced components of demand could still prove useful for some phenomena connected with political decisions and institutional changes, which are excluded here by our simplifying assumptions, all of the foregoing strongly suggests that it should not be considered universally relevant. It has in fact proved limited and misleading as soon as any attempt is made to explain the determinants of one of the 'autonomous' components (i.e. the so–called autonomous consumption expenditures).

[19] See Garegnani (1992) for a complete analysis of the relevance of this elasticity.

This elasticity of output is antithetical to two different kinds of rigidity constituting the primary reasons why similar assumptions about the irreversibility of consumption have not led to a full understanding of the possible role played by this phenomenon in the growth process.

The first is the rigidity that stems from the full–employment assumption characterising analyses based on the Marginalist principles. This kind of rigidity is responsible for the failure of the analyses of the 1940s to understand the effects of the irreversibility of consumption on growth. Although seeking to account for cyclical fluctuations in terms of the principle of effective demand, these analyses eventually tended to assume a full–employment trend of growth in analysing the long–run tendencies of the economy.[20]

The second derives from the steady–state assumption and also regards many analyses in which aggregate demand is actually attributed with an independent role in the growth process. The assumption of continuous normal utilisation of productive capacity or constant and uniform rates of growth for all the economic aggregates prevents us from clearly recognising the existence of the *elasticity* of *long–period* output. It not only introduces spurious relations between accumulation and distribution[21] but also obscures very important phenomena such as those described here, which find their major determinants in cyclical fluctuations.

6. An implication of the analysis put forward: the meaning of the long–run proportion of saving in income

There is an important implication of our analysis that concerns the meaning of the long–run proportion of saving (or consumption) in social income.

It is generally admitted in short–run analyses on the basis of the Keynesian principle of effective demand that given the *marginal* propensity to save (consume), the *amount* of savings is — ultimately — the result of decisions to invest. The proportion of saving in income is therefore not determined by individual or institutional decisions to save.

In the literature as a whole, however, the long–run *proportion* of saving in social income is *generally* seen as the result of stable patterns of individual and institutional decisions to save and, as such, that proportion is generally defined as the *average propensity to save.*[22]

[20] See Trezzini (2005).

[21] See Ciccone (1986), Garegnani (1992) and Vianello (1996).

[22] Two different groups of long–run analyses can be distinguished in this connection. The first is made up of those that stick to Keynesian principles for the short period but assume full–employment conditions for the long–run analysis. The analyses of 1940s adopted assumptions on the social relevance of consumption and its irreversibility similar to those used in this paper. The assumption of long–run full employment conditions, however, leads to the long–run value of the proportion of saving out of income being regarded as a magnitude indicating the way

The analysis presented here makes it possible to show that the proportion of saving in income must be seen neither as an index of the economy's *propensity* to save nor as a magnitude unambiguously indicative of any other specific phenomenon. The value of this proportion is generally the result of the interaction of many different phenomena and can therefore be similar in radically different circumstances and different in analogous circumstances.

We can start by assuming a given pattern of individual and institutional decisions to save, i.e. given marginal propensities to consume during the different phases of the cycle. The proportion of income saved in each phase depends on the amount of investment to be accommodated. There is evidently no reason why the *average* propensity to consume should be a constant and therefore independent of the amount of investment. This can be confirmed and developed for the long period. Marginal propensities change during the cycle as consumption moves along the zigzag path, and the proportion of saving in income changes to an even greater degree, fluctuating constantly in fact between the extreme levels of the peak and trough of the cycle.

The short–period *marginal* propensities to save giving rise to the different segments of the zigzag path of consumption can actually be regarded as somehow reflecting individual or institutional saving behaviour. The average value of the proportion of saving in income over each cycle is, however, no less independent of such behaviour than it is in the short period.

With the regular pattern of investment fluctuations upon which our example is based, the average value of the proportion of saving over the cycle is essentially determined by the proportions of investment in income at the extremes of the cycle. In our second numerical example, an average value of γ emerges from the different values, γ^i, which this proportion assumes during the cycle. On the assumption of regular fluctuations and values of the extreme proportions of investment in income, $\gamma^p = 0.3$ and $\gamma^t = 0.10$, the average proportion of saving in income is equal to 0.2. These values are determined by the *levels* of investment, which determine different values of the proportion of investment in income, and thus, in a certain sense, by the "incentive to invest".

If higher *levels* of gross investment were assumed throughout the cycle, this would mean that the proportions γ^i would be higher in all the periods, which

in which individuals and institutions decide to allocate their full–employment income between consumption and saving. As such, this *propensity* must be explained by the analysis of consumption. This interpretation has certainly oriented theory in turn toward the analysis of consumption as a problem of rational choice between consumption and saving in terms of the inter–temporal allocation of given levels of income. This approach to the analysis of consumption became dominant with the contributions by Modigliani and Brumberg (1954) and Friedman (1957). The second group is made up of analyses more or less directly based on the Cambridge equation, where the long–run proportion of saving in income is regarded as the result of the given propensities to save of the different classes and the distribution of income prevailing in relation to the rate of accumulation. The degree of capacity utilisation is determined by the assumption of

would imply a higher average γ and a lower value of β. This would imply different extremes of investment proportions — say 0.32 and 0.12 — and an average proportion of saving equal to 0.22. This high "propensity to save" — and low "propensity to consume" — would, however, be generated i) by the same marginal propensities to consume, α^e and α^r, ii) by identical consumer behaviour as represented by the relation [1], and finally iii) by constantly higher levels and more intense growth of aggregate consumption.

Moreover, the time distribution of investment fluctuations plays a crucial role in determining the average proportion of saving in income. Longer booms and/or shorter slumps will in fact mean an average proportion of investment and therefore of savings closer to the peak level even when the extreme values of these proportions are constant. In our example, with γ^p= 0.3 and γ^t = 0.10, the average proportion over the cycle could thus have any value between those extremes, say 11% or 24% depending on the shortness of the boom in relation to the recession, with the proportion of investment remaining close to 10% for most of the time rather than 30%.

There is one key point to be stressed explicitly. Once the elasticity of output with respect to changes in aggregate demand has been properly recognised, there is no reason to argue that a given degree of capacity utilisation (associated with either normal or full utilisation) eventually tends to prevail on the average over cyclical fluctuations.[23] Only in this case would we be forced to maintain that the same process guaranteeing normal or full average utilisation would also single out a given proportion of investment in income between the two extremes of the fluctuation.

Both the extreme values of γ and the pattern of fluctuations can be regarded as expressions of what can be broadly described as the intensity of the 'incentive to invest'. Different behaviours of investment over the cycle will give rise to different proportions of saving in income even if we assume exactly the same saving behaviours as expressed by the short–period consumption functions. It may thus appear that the proportion of saving in income can be interpreted as an index of the intensity of accumulation. This interpretation is, however, again incorrect or at least incomplete.

In the second numerical example, it is possible by changing the values of the marginal propensities to consume (α^e and α^r) to obtain an infinite number of different average rates of growth and of capital accumulation, all of which, however, correspond to an identical average value — deriving from the same cyclical fluctuations — of the proportion of investment out of income.

steady growth conditions and the proportion of saving in income is the expression of individual and institutional decisions to save. The relationship between accumulation and distribution can be seen as misleading, however, as soon as the elasticity of output with respect to changes in aggregate demand is recognised.

[23] See Garegnani (1992), Trezzini (1995) and (1998), and Palumbo and Trezzini (2001) on this point.

It can thus be concluded that consumer behaviour manifests itself in the continuous acquisition of standards of consumption and in the way in which these standards increase or decrease with changes in income. This behaviour has only an indirect influence on the average proportion of consumption (or saving) in income through the *marginal* propensities to consume that determine the value of the multipliers and the levels of income corresponding to certain levels of gross investment. Other circumstances affecting the value of the average proportion of consumption in income are not, however, connected with consumers' choices. These circumstances certainly include, for example, the intensity of the incentive to invest (i.e. the average level of investment) and the pattern of fluctuations in investment.

7. The role of the examples as tools

One last point should be made clear before we end. The meaning of the numerical examples used to study the phenomenon in the present analysis is radically different from the meaning assigned to 'models' in the mainstream literature. The term "numerical example" has been used in order to highlight this distinction.

The examples given are to be regarded as tools for the analysis of the relationship between the expansion of consumption and economic growth. This analysis is undertaken here with no reference to the many other circumstances that tend at the same time to affect both the process of growth and the behaviour of consumption in real economies. Most of these are historical, political and institutional circumstances and, as such, cannot be easily represented by means of simple and general quantitative relations.

Our numerical examples thus make it possible to study a force regarded as operating in the generality of possible cases and therefore affecting the process of growth with no reference to those many other circumstances, which are not susceptible of numerical treatment by their very nature.

The asymmetry of consumption behaviour and its effects are thus represented here by means of relations between variables that would probably never manifest themselves empirically in the exact form in which they appear in our examples.

The formalisation adopted in our examples of the general idea of asymmetric consumption behaviour is extremely simplified. As such it is simultaneously very useful in constructing an example and totally unsuitable as a means of capturing the complexity of real phenomena. It should therefore not be interpreted as a "consumption function", i.e. a relation in which each point identifies a possible pair of values of income and consumption capable of becoming empirically manifest in all possible circumstances. The asymmetry of consumption and

the continuous acquisition of higher standards of consumption could in fact assume different forms and different intensities in relation to many different circumstances that are not susceptible of simple quantitative treatment. The state of income distribution, the rules governing the labour market, and the existence and extent of welfare systems are only some of the many political factors that certainly affect the behaviour of aggregate consumption.

Furthermore, it is also possible for other sources of growth to be active in a real economy together with the incentive for growth stemming from the expansion of the standards of consumption. Some "autonomous" components of aggregate demand, such as government expenditure or exports, may have a positive trend. Their effects can strengthen or weaken the effect of the continuous acquisition of growing standards of consumption, thus modifying the relations that describe it. In these cases, the actual patterns of the cyclical oscillations would certainly differ from the one assumed in our examples, and the continuous acquisition of rising standards of consumption would not take the form of asymmetry in the marginal propensities to consume. A different analysis would have to be developed in order to take these more general cases into consideration.

REFERENCES

BENNION, E. G. (1946), "The Consumption Function: Cyclically Variable?", *The Review of Economic Statistics*, 28, pp. 219–24.

CICCONE, R. (1986), "Accumulation and Capacity Utilization: Some Critical Considerations on Joan Robinson's Theory of Distribution", *Political Economy, II*, 1, pp.17–36.

DUESENBERRY, J. S. (1948), "Income–consumption relations and their implications", in *Income, employment and public policy; essays in honor of Alvin H. Hansen* Lloyd A. Metzler (Ed.), New York, W.W. Norton.

— (1949), *Income, Saving and the Theory of Consumer Behavior*, Cambridge, Mass. Harvard University Press.

FRIEDMAN, M. (1957), *A theory of the Consumption Function*, Princeton, Princeton University Press.

GALBRAITH, J. K. (1958), *The Affluent Society*, reprinted (1965), Bombay, Asia Publishing House.

GAREGNANI, P. (1962), "Il Problema della Domanda Effettiva nello Sviluppo Economico Italiano", Roma, SVIMEZ.

— (1992), "Some Notes for an Analysis of Accumulation", in J. Halevi, D. Laibman, E. Nell (Eds) *Beyond the steady–state*, Basingstoke & London, Macmillan.

GAREGNANI, P. and PALUMBO, A. (1998), "Accumulation of Capital", in H. D. Kurz and N. Salvadori (Eds), *The Elgar Companion to Classical Economics*, Aldershot, Edward Elgar.

GAREGNANI, P. and TREZZINI, A. (2005), "Cycles and Growth: A Note on Development in a Market Economy" *Quaderno di Ricerca n. 5 Centro Studi e Documentazione "Piero Sraffa"*, Roma.

GUALERZI, D. (2001), *Consumption and Growth: Recovery and Structural Change in the U.S. Economy*, Aledershot, Edward Elgar.

KURZ, H. D. (1990), "Accumulation, Distribution and the 'Keynesian Hypothesis'", in K. Bharadwaj and B. Schefold (Eds), *Essays on Piero Sraffa*, London, Unwin Hyman.

LEVINE, D. P. (1998), *Subjectivity in Political Economy. Essays on Wanting and Choosing*, London, Routledge & Kegan Paul.

MODIGLIANI, F. (1949), "Fluctuations in the Saving–Income Ratio: A Problem in Economic Forecasting", *Studies in Income and Wealth, 11*, New York, NBER, pp. 371–441.

MODIGLIANI, F. and BRUMBERG, R. (1954), "Utility Analysis and the Consumption Function: An Interpretation of Cross–Section Data", in Kurihara K.K. (Ed.), *Post–Keynesian Economics*, London, Allen & Unwin.

MOSAK, M. S. (1945), "Forecasting Postwar Demand: III" , *Econometrica*, 13, pp. 25–53.

SAMUELSON, P. A. (1943), "Full Employment After the War", in Harris, S. E.

(Ed.), *Postwar Economic Problems*, New York, McGraw Hill, pp. 27–53.

SERRANO, F. (1995), "Long period effective demand and the Sraffian supermultiplier", *Contributions to Political Economy*, XIV, pp. 67–90.

SMITHIES, A. (1945), "Forecasting Postwar Demand: I" , *Econometrica*, 13, pp. 1–14.

THOMAS, J. J. (1989), "The Early Econometric History of the Consumption Function", *Oxford Economic Papers*, 41, 1, pp. 131–49.

TREZZINI, A. (1995), "Capacity Utilisation in the Long Run and the Autonomous Components of Aggregate Demand", *Contributions to political economy*, XIV, pp. 33–66.

— (1998), "Capacity Utilisation in the Long Run: Some further considerations" *Contributions to Political Economy* n.17, pp. 53–67.

— (2005), "The Economics of Consumption as a Social Phenomenon: a Neglected Approach to the Analysis of Consumption", forthcoming in *Quaderni di Ricerca del Dipartimento Innovazione e Società*, Roma, Aracne.

VEBLEN, T. (1899), *The Theory of the Leisure Class*, Boston, Houghton Mifflin Company, 1973.

VIANELLO, F. (1996), "Joan Robinson on normal prices (and the normal rate of profits)", in M. C. Marcuzzo, L. L Pasinetti, A. Roncaglia (Eds), *The Economics of Joan Robinson*, London, Routledge.

APPENDIX

First Numerical Example

Table 1a. Income, consumption and investment on the assumption of asymmetrical marginal propensities to consume ($\alpha^e = 0{,}6$; $\alpha^r = 0{,}1$).

Time	Y	C	I	α
1	100	70	30	0,6
2	95,56	69,56	26	0,1
3	91,11	69,11	22	0,1
4	86,67	68,67	18	0,1
5	82,22	68,22	14	0,1
6	77,78	67,78	10	0,1
7	87,78	73,78	14	0,6
8	97,78	79,78	18	0,6
9	107,78	85,78	22	0,6
10	117,78	91,78	26	0,6
11	127,78	97,78	30	0,6
12	123,33	97,33	26	0,1
13	118,89	96,89	22	0,1
14	114,44	96,44	18	0,1
15	110,00	96,00	14	0,1
16	105,56	95,56	10	0,1
17	115,56	101,56	14	0,6
18	125,56	107,56	18	0,6
19	135,56	113,56	22	0,6
20	145,56	119,56	26	0,6
21	155,56	125,56	30	0,6
22	151,11	125,11	26	0,1
23	146,67	124,67	22	0,1
24	142,22	124,22	18	0,1
25	137,78	123,78	14	0,1
26	133,33	123,33	10	0,1
27	143,33	129,33	14	0,6
28	153,33	135,33	18	0,6
29	163,33	141,33	22	0,6
30	173,33	147,33	26	0,6
31	183,33	153,33	30	0,6
32	178,89	152,89	26	0,1
33	174,44	152,44	22	0,1

Table 1b. Income, consumption and investment on the assumption of constant marginal propensity to consume ($\alpha^e = \alpha^r = 0{,}5$).

Time	Y	C	I	α
1	100	70	30	0,5
2	92,00	66,00	26	0,5
3	84,00	62,00	22	0,5
4	76,00	58,00	18	0,5
5	68,00	54,00	14	0,5
6	60,00	50,00	10	0,5
7	68,00	54,00	14	0,5
8	76,00	58,00	18	0,5
9	84,00	62,00	22	0,5
10	92,00	66,00	26	0,5
11	100,00	70,00	30	0,5
12	92,00	66,00	26	0,5
13	84,00	62,00	22	0,5
14	76,00	58,00	18	0,5
15	68,00	54,00	14	0,5
16	60,00	50,00	10	0,5
17	68,00	54,00	14	0,5
18	76,00	58,00	18	0,5
19	84,00	62,00	22	0,5
20	92,00	66,00	26	0,5
21	100,00	70,00	30	0,5
22	92,00	66,00	26	0,5
23	84,00	62,00	22	0,5
24	76,00	58,00	18	0,5
25	68,00	54,00	14	0,5
26	60,00	50,00	10	0,5
27	68,00	54,00	14	0,5
28	76,00	58,00	18	0,5
29	84,00	62,00	22	0,5
30	92,00	66,00	26	0,5
31	100,00	70,00	30	0,5
32	92,00	66,00	26	0,5
33	84,00	62,00	22	0,5

SECOND NUMERICAL EXAMPLE

Table 2a. Income, consumption and investment on the assumption of asymmetrical marginal propensities to consume ($\alpha^e = 0{,}6$; $\alpha^r = 0{,}1$).

Time	Y	C	I	I/Y= γ	α
1	100,00	70,00	30,00	0,3	0,6
2	93,75	69,38	24,38	0,26	0,1
3	88,24	68,82	19,41	0,22	0,1
4	83,33	68,33	15,00	0,18	0,1
5	78,95	67,89	11,05	0,14	0,1
6	75,00	67,50	7,50	0,1	0,1
7	86,54	74,42	12,12	0,14	0,6
8	102,27	83,86	18,41	0,18	0,6
9	125,00	97,50	27,50	0,22	0,6
10	160,71	118,93	41,79	0,26	0,6
11	225,00	157,50	67,50	0,3	0,6
12	210,94	156,09	54,84	0,26	0,1
13	198,53	154,85	43,68	0,22	0,1
14	187,50	153,75	33,75	0,18	0,1
15	177,63	152,76	24,87	0,14	0,1
16	168,75	151,88	16,88	0,1	0,1
17	194,71	167,45	27,26	0,14	0,6
18	230,11	188,69	41,42	0,18	0,6
19	281,25	219,38	61,88	0,22	0,6
20	361,61	267,59	94,02	0,26	0,6
21	506,25	354,38	151,88	0,3	0,6
22	474,61	351,21	123,40	0,26	0,1
23	446,69	348,42	98,27	0,22	0,1
24	421,88	345,94	75,94	0,18	0,1
25	399,67	343,72	55,95	0,14	0,1
26	379,69	341,72	37,97	0,1	0,1
27	438,10	376,77	61,33	0,14	0,6
28	517,76	424,56	93,20	0,18	0,6
29	632,81	493,59	139,22	0,22	0,6
30	813,62	602,08	211,54	0,26	0,6
31	1139,1	797,34	341,72	0,3	0,6

Table 2b. Income, consumption and investment on the assumption of symmetrical marginal propensities to consume ($\alpha^c = \alpha^r = 0{,}5$).

Time	Y	C	I/Y= γ	I	α
1	100	70	0,3	30	0,5
2	83,33	61,67	0,26	21,67	0,5
3	71,43	55,71	0,22	15,71	0,5
4	62,50	51,25	0,18	11,25	0,5
5	55,56	47,78	0,14	7,78	0,5
6	50,00	45,00	0,1	5,00	0,5
7	55,56	47,78	0,14	7,78	0,5
8	62,50	51,25	0,18	11,25	0,5
9	71,43	55,71	0,22	15,71	0,5
10	83,33	61,67	0,26	21,67	0,5
11	100,00	70,00	0,3	30,00	0,5
12	83,33	61,67	0,26	21,67	0,5
13	71,43	55,71	0,22	15,71	0,5
14	62,50	51,25	0,18	11,25	0,5
15	55,56	47,78	0,14	7,78	0,5
16	50,00	45,00	0,1	5,00	0,5
17	55,56	47,78	0,14	7,78	0,5
18	62,50	51,25	0,18	11,25	0,5
19	71,43	55,71	0,22	15,71	0,5
20	83,33	61,67	0,26	21,67	0,5
21	100,00	70,00	0,3	30,00	0,5
22	83,33	61,67	0,26	21,67	0,5
23	71,43	55,71	0,22	15,71	0,5
24	62,50	51,25	0,18	11,25	0,5
25	55,56	47,78	0,14	7,78	0,5
26	50,00	45,00	0,1	5,00	0,5
27	55,56	47,78	0,14	7,78	0,5
28	62,50	51,25	0,18	11,25	0,5
29	71,43	55,71	0,22	15,71	0,5
30	83,33	61,67	0,26	21,67	0,5
31	100,00	70,00	0,3	30,00	0,5

ISSN 1722-5604