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Keynes' concept of capital

di

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Contents

1. Introduction	page	1
I. The origin of the problem		1
II. The focus of the present work		2
2. Early works		4
I. The concept of capital in Keynes' early works		4
3. 'A Treatise on Money'		5
I. The concept of capital in 'A Treatise on Money'		5
II. Capital measurement: index numbers and length of the production process		5
III. Choice of technique and rate of interest		6
IV. Rate of interest and relative prices		7
V. Conclusions		7
4. 'The General Theory'		9
I. Introduction		9
II. Short and long run		9
III. The development of the scarcity theory of the yield of capital		10
IV. The analytical scheme of the scarcity theory of the yield of capital		12
V. The period of production		15
VI. The lecture at the Eugenics Society		19
VII. The own rates of interest		20
VIII. The scarcity scheme with a given level of employment		23
IX. Rate of interest and relative prices		24
X. Conclusions		26
5. The 'debate on finance'		28
I. Savings, investment and interest rate		28
II. Capital, marginal productivity of capital and interest rate		29
6. Conclusions		31
I. Keynes' concept of capital		31
II. The concept of roundaboutness		32
III. Autonomy from tradition		32

1. Introduction

I. The origin of the problem

1. The purpose of this essay is to inquire into the concept of capital to which Keynes refers in his writings. Two questions related to the understanding of Keynes' main work, 'The General Theory of Employment Interest and Money' (GT), justifies this choice. The first question is the interpretation of the concept of marginal efficiency of capital developed by Keynes in GT ch.11 (pp.135-7). The second is the comprehension of the relations between Keynes' GT and the traditional theory that he criticized.

2. The schedule of the marginal efficiency of capital is a schedule which relates "the rate of aggregate investment to the corresponding marginal efficiency of capital in general which that rate of investment will establish" (GT ch.11 p.136); it is obtained by aggregating the individual schedules defined "for all the different types of capital" (GT p.136). Each individual schedule is a purely macroeconomic construction; that is, it represents the rate of return that a given capital asset can afford as a function of the aggregate volume of investment in that asset and not as a function of the decisions to invest of an individual firm. The calculation of the rate of return -or marginal efficiency- of each given type of asset may be interpreted as based on an 'average' of the individual firms' evaluations of the yields that that asset can afford and on the replacement cost corresponding to each level of aggregate demand for investment goods (Naldi 1986). When a short period is considered, the relation between volume of investment and marginal efficiency of a given asset is mainly influenced by the replacement cost; when the period considered is longer the main influence is exerted by the size of the stock of the capital good: "the prospective yield will fall as the supply of that type of capital is increased" (GT ch.11 p.136).

3. This interpretation of the construction of the schedule of the marginal efficiency of capital (mec) is at variance with the view presented by Pasinetti (1974 ch.2) who considers the mec schedule as referred only to short run contexts and as constructed completely at the level of the individual firm.

When we consider the interpretation presented by Lerner (1937 and 1944 ch.25), who derives a short run mec schedule from a long run function of the marginal productivity of capital (both being defined at an aggregate level), we face the problem of finding out the legitimacy of using such an aggregate concept of capital with reference to GT, where

Keynes apparently considers -in connection to the concept of mec- only individual capital goods and not an aggregate factor. If that use were legitimate, we should, in principle, agree with Garegnani, who states (1979 p.77) that Keynes inherits the schedules of the marginal efficiency of capital and of the marginal productivity of labour from the traditional theory and that those inheritances -hence the mec schedule- are among the main causes of the analytical weakness of his criticism to that theory.

4. Considering the works of Garegnani, Lerner and Pasinetti we are introduced to the second of the questions mentioned above, that is, the relation between Keynes' GT and the traditional theory that he criticized. In fact, if we do not accept Pasinetti's short run interpretation of the concept of marginal efficiency of capital, we find that the construction of the mec schedule plays a crucial role to establish -through the use of the concept of capital- a relation between Keynes' GT and the theory he criticized. But, having reached this stage, the problem of understanding the nature of the concept of capital in GT and in other of Keynes' works -whether or not it is intended as a single magnitude which may be unambiguously taken as given to represent the endowment of the society of a factor of production- acquires an autonomy which justifies the direct study that we have undertaken in this essay.

II. The focus of the present work

1. The main point of interest, for the aim we are pursuing, is certainly Keynes' GT and, in particular, ch.s 11, 16, 17 and 24.

Our interest in ch.s 11 and 24 is due to the definition (ch.11) of the schedule of the marginal efficiency of capital and to the use of that schedule (ch.24) within a long run context.

The relevance of ch.s 16 and 17 is related to the explanation they provide of the forces which govern, in the long run, the return to individual types of capital assets and to capital in general. The analysis of GT ch.16 will be of particular importance as this chapter contains a discussion which compares two different explanations of the origin of the yield of capital: scarcity and productivity. Each of these sources appears to be related to a conception of capital; productivity is related to a concept of capital as a homogeneous factor of production; scarcity to a concept of capital as a set of given commodities. Within the discussion of scarcity and productivity -in GT ch.16- the concept of roundaboutness, crucial to the debates on capital theory of the early 1930s, is introduced providing a further element to our analysis.

2. Notwithstanding the central importance of Keynes' GT, to cast a clearer light on the questions under scrutiny, it

is appropriate to consider writings and debates dating to years before and after the publication of GT. Hence, after a brief review of the use of the concept of capital in Keynes' early works, we will consider 'A Treatise on Money' (TM) and part of the debate which followed the publication of that book.

As a direct treatment of the concept of capital is absent from TM, our discussion will focus on such points, as the measurement of the quantity of capital and the choice of technique, which indirectly illuminate the underlying conception of capital. From this point of view, the debate between Keynes and Hayek -subsequent to the publication of 'A Treatise on Money'- is of particular interest, because Hayek directly touched, and forced Keynes to do the same, upon several points of capital theory.

The so called 'debate on finance' will be discussed after the chapter dedicated to 'The General Theory'. This second debate -if not directly centred on the concept of capital- is indirectly relevant as it contains a discussion of the relations between productivity conditions and determination of the rate of interest which allows us to observe the whole object from a slightly different point of view: that of the comparison between savings and investment. This new element will appear to be useful to establish a continuity through Keynes' writings and to complete the picture of a consistent and autonomous conception of capital developed on the basis of the 'scarcity theory' presented in GT ch.16.

2. Early works

I. The concept of capital in Keynes' early works

1. The concept of capital does not receive a special attention in Keynes' early works. In 'The Economic Consequences of the Peace' (1919 CW II p.11-3) and, more clearly, in 'A Tract on Monetary Reform' (1921 CW IV p.28-9), the concept of capital appears in two fashions: as 'capital goods' or 'capital equipment' and as a magnitude which can be increased by means of savings. No theoretical analysis of the concept is introduced and its treatment could be regarded as consistent with -or influenced by- Marshall's statement that the discoveries of economics in capital theory have added nothing to what is commonly known to businessmen (Marshall 1920 p.580).

Within this description, the connection with the traditional theory which identifies capital with an homogeneous factor does not lie in the most direct mention of capital goods, which is peculiarly neutral from a theoretical point of view, but in the relationship which links capital accumulation and savings.

These two aspects, which characterize Keynes' usage of the concept of capital in the early works, will appear also in later writings and will maintain -as we shall see in the following chapters- a central role for the understanding of his view, even if their treatment will be considerably broadened and modified.

3. 'A Treatise on Money'

I. The concept of capital in 'A Treatise on Money'

1. The first point to be noted, with reference to 'A Treatise on Money' (TM), is that no discussion is devoted to the concept of capital as such. Lacking a direct treatment of capital theory, we have to consider those parts of the book where, in different connections, questions related to capital and investment are discussed.

The questions which will be considered in the following sections are the measurement of the quantity of capital and the relation between capital and interest rate. The parts of TM on which our attention will focus are ch.9 (Certain Definitions), ch.13 (The Modus Operandi of the Bank Rate) and ch.s 27, 28, 29 (Fluctuations in the Rate of Investment: Fixed, Working and Liquid Capital).

II. Capital measurement: index numbers and length of the production process

1. In TM fixed capital, and capital in general, is always presented as a collection of goods. Moreover, the capital goods currently in use seem to be the only ones available to the choice of the entrepreneurs, so that no question of 'capital deepening' is considered and only technical progress can cause a modification of the production techniques adopted.

To support and clarify this interpretation we can refer to Keynes' reply to Hayek's review of his book. Keynes (1931 p.255-6) treats the problem of comparing bundles of physically different capital goods as an index number problem, similar in all respects to the problems which arise with reference to consumption goods. Hayek's answer to this problem, on the contrary, (1931 p.279-81) would require a measurement of the quantity of capital independent of price relations, consistently with his conception of capital as a factor whose magnitude may be measured by means of a time length; he would not merely follow the capricious changes due to technical progress, as Keynes' index number approach seems to imply, but a theoretical explanation of its size and of its modifications. Keynes should have adopted the same or a similar direction, because of his recognition - prompted by Hayek's critical review - of the 'capital theory problem' (Keynes 1931 p.252-3), nevertheless, he chose a different route.

2. Another expression, beside 'capital goods', which may be relevant in this connection - particularly in the light of the debate between Hayek and Keynes and of the argument

developed in GT ch.14- is 'length of the production process', which we can find in TM ch.s 20 and 27 (but not in the index).

The discussions in which this expression appears, as Hayek complains (1931 p.280 n.1), always refer to 'working capital' and never to the 'stock of capital'. This attitude could be explained as a product of a lack of interest in the concept of 'length' (referred to the production process or to the technique) as a tool to measure the stock of capital. The usefulness of the concept, to Keynes, would derive from its more direct meaning of time length influencing the volume of working capital -measured (TM ch.28 p.92) as a fraction of the value of the final output by assuming a relation which describes the 'growth in value' of the product during the production process- employed in the economy, given the technique in use.

III. Choice of technique and rate of interest

1. Within the inquiry of the nature of the concept of capital used in TM, the problem of the choice of technology and of its relation to the value of the rate of interest is directly relevant. With reference to this problem, we do not find an explicit analysis or explicit statements, but a picture can still be drawn.

Changes in technology are not attributed to changes of the rate of interest, but only to the behaviour of innovative entrepreneurs, following the Schumpeterian definition (TM ch.27 pp.85-6). The actions of these entrepreneurs are not prompted by changes of the rate of interest; in fact the role of the banking system -which can regulate such rate- is just the opposite: to allow the undertaking of such innovative actions.

That the influence of the rate of interest -in Keynes' view- does not work in the other way is confirmed by the fact that, in TM ch.13, when some effects of its modification are explicitly discussed, we find that only the existing capital goods are considered. Hence, the kind of technical change essential to the view of capital as an homogeneous factor of production combined in variable proportions to the other factors (i.e. the use of capital goods and techniques previously neither produced nor used) is ignored; accordingly, we should regard as ignored also the corresponding concept of capital. (1)

2. We can further analyse the question of technical change by referring again to Hayek's review of Keynes' TM. According to Hayek, Keynes' concept of investment does not involve technical change, while it should be in the nature of the concept of investment "producing other machinery, for the same purpose but of a greater degree of efficiency, to take the place of inferior machinery, etc., used up in the current production of consumption goods" (1931b p.286).

In face of this position we find Keynes' remarks on Hayek's 'Prices and Production', which imply an adverse appreciation of the idea that investment may be directed, as a rule, towards capital goods of a kind not previously produced (Keynes 1931 p.249 n.2, p.250).

To the question of why Keynes shows such a hostile or astonished view towards the case of investment in 'technically new' goods, we can answer only by referring to a peculiar (and not developed) interpretation of the process of technical change. On the other hand, a better understanding of the concepts of capital and investment based on given capital goods may be attained by considering the 'scarcity theory' of the long run return to capital goods which will be stated in GT ch.16. In connection with that chapter, the problem will be further studied; for the moment we have to satisfy ourselves simply recording Keynes' position.

IV. Rate of interest and relative prices

1. Before concluding the chapter, another question should be mentioned. Keynes, in TM and also -as we shall see- in GT, does not consider the effects of a change of the rate of interest (or of the rate of profit: in this context we regard these magnitudes as identical) on relative prices. Actually, changes of the relative prices ensuing from a modification of the interest rate are mentioned (TM ch.13 p.181, 189), but the causes which govern such changes are not inquired and are lumped together in a set of 'other considerations'; neither the specific effects on the demand and supply prices of capital goods are thoroughly worked out.

On this ground, the analysis developed by Keynes certainly presents a deficiency. As the discussion of the changes in relative prices would have more clearly posed the question of which conditions allow a demand function for investment goods to be drawn, it should have prompted Keynes to devote more space to the definition of his conception of capital goods and of the investment process. Nevertheless, as will happen in GT, this problem remains untouched and, to justify it, we can only note that that was the general attitude prevailing in the 1930s in the works and debates on this subject.

V. Conclusions

1. Notwithstanding the attitude towards Hayek's work reported in this chapter, Keynes states that the theory of capital and interest is the ground on which is to be found "the real nature of the contribution to economic theory which Dr.Hayek is making". This statement, combined with Keynes' assertion (in agreement with Hayek) that he does not

"propound any theory of capital and interest" (Keynes 1931 p.394), does not clarify the picture and suggests that a clear cut conclusion upon the concept of capital used in TM cannot be reached. Nevertheless, there are several hints of a conception which considers capital goods only in their individual technical specification, that does not treat capital as a homogeneous factor of production to be combined with the other factors in variable proportions and simply ignores the question of a technical change independent of technical progress. This conception will be considered again in the next chapter, where the treatment of capital adopted in GT will be inquired.

Notes

(1) It may be noted that in the chapter we have been referring to -i.e. TM ch.13- the exposition is very similar to what will be found in GT ch.11 (The Marginal Efficiency of Capital). The main difference, apart from the general development of the matter, is that no short run influence of the supply price of capital goods on their profitability is accounted for. Only the long run influence, as it will be more explicitly defined in GT, of the available quantity of each capital good on its prospective yield plays a role (TM ch.13 p.181).

4. 'The General Theory'

I. Introduction

1. To characterize the conception of capital which is used in Keynes' GT, the analysis will focus on ch.11 (The Marginal Efficiency of Capital), ch.16 (Sundry Observations on The Nature of Capital), ch.17 (The Essential Properties of Interest and Money) and ch.24 (Concluding Notes on the Social Philosophy towards which The General Theory Could Lead) of that book and on the writings related to its preparation and 'defence and development'. The inquiry into the concept of capital used in TM should appear as a background -also in connection with the discussion with Hayek- to the developments which can be found in GT; at the same time, the problems previously considered related to TM should be enlightened.

2. In the following sections, after a brief analysis of the distinction between long and short run adopted in GT (sect.II), the scarcity theory of the yield of capital will be considered (sect.s III and IV).

In section V the concept of 'roundaboutness' (or period of production), which is used within the same scheme mentioned above, will be discussed and its ability to characterize an alternative definition of the concept of capital within GT will be assessed. Section VI will focus again on the concept of roundaboutness, with reference to a lecture held by Keynes in early 1937 at the Eugenics Society.

In section VII the analysis of the 'own rates of interest', developed in GT ch.17, will be examined and compared with the results previously reached in the chapter. Sections VIII and IX will consider two further questions which concern the treatment of capital in GT: the applicability of the scarcity scheme to cases where the level of employment is given and the consequences of the dependency of relative prices on the value of the interest rate when the analysis compares long period positions and not merely partial equilibria.

Section X will conclude the chapter.

II. Short and long run

1. It is difficult to attribute each part of GT, and each part relevant to our discussion, to short or long run contexts; indeed, an interpretation of Keynes' book may regard as inappropriate such a sharp distinction. A general criterion, which to our purpose appears to be necessary, can be established following the distinction drawn in GT ch.11

(p.136) on the reasons which lead to a reduction of the marginal efficiency of a given capital asset. Whenever the quantity of a capital good is increased in such a measure as to modify its return, or the diminished yield is not attributed to an increased cost of production, then the discussion should be placed in a long period context. On the other hand, if a decline in the return to a capital good is not attributed to the greater quantity available or employed of that good, but to an increased production cost, then the discussion should be set in a short run context.

2. A further distinction should be drawn -within long run analyses- between partial equilibrium analysis and comparison between permanent positions; in the first case only a single capital good is considered, while in the second case all capital goods are the object of inquiry. The distinction is not clearly drawn by Keynes, but it is plausible to regard a comparison between permanent positions as the most appropriate framework to interpret GT ch.16 and GT ch.17.

III. The development of the scarcity theory of the yield of capital

1. The 'scarcity theory' -which is referred to as 'theory' by Keynes himself, even if it is presented in few sentences- appears to be the basic statement, in GT, of Keynes' position on the origin of the yield of capital and on the nature of capital; on this ground, it should provide the justification for Keynes' assertions on the decline of the return to capital goods when the available stock of these goods is increased and for Keynes' choice to consider capital goods in their individual specification and not as an aggregate quantity, from the earlier stage of his treatment of investment (GT ch.11 pp.135-7).

To begin the discussion it is convenient to reproduce the relevant passages from GT ch.16 sect.II.

"It is much preferable to speak of capital as having a yield over the course of its life in excess of its original cost, than as being productive. For the only reason why an asset offers a prospect of yielding during its life service having an aggregate value greater than its initial supply price is because it is scarce; and it is kept scarce because of the competition of the rate of interest on money. If capital becomes less scarce, the excess yield will diminish without its having become less productive -at least in the physical sense.

"I sympathise, therefore, with the preclassical doctrine that everything is produced by labour, aided by what used to be called art and is now called technique, by natural resources which are free or cost a rent according to their scarcity or abundance, and by the results of past labour, embodied in assets, which also command a price according to

their scarcity or abundance. It is preferable to regard labour, including, of course, the personal services of the entrepreneur and his assistants, as the sole factor of production operating in a given environment of technique, natural resources, capital equipment and effective demand" (GT ch.16 pp.213-4).

2. The origin of these passages may be traced back to the earlier writings which can be regarded as drafts of Keynes' GT (drafts of chapters dated approximately from mid 1933: CW XXIX p.116, CW XIII pp.453-4), but the basic idea of scarcity already appears in the essay 'Economic Possibilities for Our Grandchildren' (1930 CW IX) and in the book 'The Economic Consequences of the Peace' (1919 CW II pp.11-3). To some extent it could be regarded as a concept whose meaning, validity and implications (e.g. the end of scarcity) are taken for granted; its explicit discussion being stimulated by external facts which represent a direct or indirect criticism of its validity. With reference to the writings just mentioned, the criticism would have been prompted by events related to the First World War, by the economic depression which began in 1929 and -on a very different level- by Hayek's remarks on the absence of a theory of capital in Keynes' TM.

3. The main difference, with respect to the concept of scarcity, between the earlier drafts and the final text of GT -which is not altered through the 1934-5 galley proofs- is that the distinction between the concepts of scarcity and of productivity as sources of the yield is more clearly stated (even if not 'analytically explained'). Such an improved clarity of distinction is reached in parallel with the progressive elimination of any reference to 'productivity' in the passages which will constitute ch.11 of the final text.

As the text evolved from the early drafts to the galley proofs it faced the critical reading of Keynes' friends. No one objected to this justification of the yield of capital except D.H.Robertson, who wrote in his comments: "I find this muddling. There is no opposition between 'productivity' and 'scarcity'. Things have value not simply because they are uncommon, but because they are uncommon relatively to the demand for them, which in the case of factors of production depends on their productivity, conceived as a schedule." (CW XIII p.507).

Regrettably, Keynes did not answer to Robertson's remark on productivity and scarcity; but their positions may still be analysed -although in a slightly different context, because the concept of scarcity will not be mentioned again- within the so called 'debate on finance'; considering that debate, in chapter 5 of this work, Keynes' and Robertson's positions will be further discussed and the cause of their disagreement singled out.

The general absence of comment on this point from the

other scholars who read the proofs of GT could be explained by their acceptance of the concept on the ground of short period considerations. But, if we follow the distinction between long and short run contexts characterized in GT ch.11, then we have to regard the scarcity theory as directly related to the long period only. Keynes himself, a few pages after the passages quoted above, writes: "We have seen that capital has to be kept scarce enough in the long period to have a marginal efficiency which is at least equal to the rate of interest for a period equal to the life of capital, as determined by psychological and institutional conditions" (GT p.217).

In this way the 'scarcity theory' evolved through the preparation of Keynes' book and consolidated its position as the fundamental explanation of the return on capital.

IV. The analytical scheme of the scarcity theory

1. The analytical scheme underlying the outline of the 'scarcity theory' may be interpreted and illustrated as follow.

Capital goods are considered in their individual specification; the choice of technique not being part of the basic scheme or, at least, not being regarded as capable of modifying the meaning of that scheme. If a concept of technical change -related to different degrees of capital intensity- had been considered, it would have been meaningless to state that "if capital becomes less scarce, the excess yield will diminish, without its having become less productive -at least in the physical sense" (GT p.213).

The availability of consumption goods is the measure, or the content, which justifies the use of the term 'scarcity' in connection with capital goods. The justification of this statement seems to emerge directly from the text of chapters 16 and 24, but it is not possible to find a passage which explicitly motivates such interpretation. To this purpose we can refer to the essay 'Economic Possibilities for Our Grandchildren', which allows us to identify scarcity with 'the economic problem' or 'the struggle for subsistence' (ideas contained in this essay will be found in GT ch.24) and to regard as possible 'the end of scarcity' (Xenos 1987).

An alternative interpretation of this concept of scarcity could simply imply that capital goods are scarce with respect to the demand for them. But if we follow Keynes refusing to consider productivity as the basic source of the yield of capital goods, then we are bound to refer, again, to the demand for the products obtained by applying capital equipment, hence to consumption goods.

2. On this basis, which characterizes Keynes' view in the chapters of GT concerned with long term prospects of accumulation, two main relations can be defined:

i. in a given economy, arbitrarily chosen with respect to the technical specification, any rate of return over capital may be established. In fact, that rate would not depend on the technical characteristics of production, but on the properly maintained scarcity of goods.

ii. a high rate of return over capital is to be associated with a low level of real wages, that is with a high scarcity of consumption goods; as the quantity of capital goods -or, in a restricted case, of a single capital good- is increased the rate of return on capital goods -or on the specific capital good considered- diminishes (1).

3. This economy may be represented by means of a simple system of equations (similar to those employed by Sraffa), where only two commodities (for simplicity) are distinguished: consumption and investment goods. The relation between the price of the consumption good and the money wage -both being exogenously given- indicates the level of scarcity of consumption goods; once the level of scarcity is fixed, the value of the rate of profit and the price of the capital good are univocally determined.

We can use this system to represent the effect of accumulation on scarcity and on the return to capital (a positive accumulation would reduce both of them) without introducing further complications only in the case of constant returns to scale, and this is the warning Sraffa refers to have received from Keynes (Sraffa 1960 p.iv) after having submitted to him an early draft of his 1960 book. Anyway, it seems to be improper to establish a strict similitude between this representation and that later proposed by Sraffa. In fact, in this case, the variations of the rate of profit and of the real wage are achieved by means of variations in the volume or in the composition (the term 'composition' is referred to the distinction between consumption and investment goods) of output, while, in the case of Sraffa's system, volume and composition of output -physically specified- are not modified.

4. We can now disregard the observations developed in the previous paragraph and return to the two basic relations indicated in paragraph 3.

Two main features emerge. First, no description of capital other than as a collection of commodities appears; nor does it seem to be necessary to secure consistency to this representation of the economy. Second, the ground is clearly prepared for a crucial role for the money rate of interest in the determination of the return over capital, the rate of accumulation and the level of activity.

The second of these features is developed in GT ch.17 with the analysis of the own rates of interest. The first feature does not receive direct attention and has to be evaluated indirectly through a comparison with those passages where the same approach is maintained and those where the potentially alternative concept of roundaboutness

is introduced; these analyses will be developed in the following sections V, VI and VIII.

5. Before leaving the subject, a few further questions related to the scarcity theory outlined by Keynes should be considered. The problems are mainly connected with the second of the two paragraphs quoted from Keynes' GT at the beginning of section III of this chapter.

We have already maintained that the scarcity theory is to be more properly placed in a context of long run movements and of comparison between permanent positions. This view is supported by the complete absence of references to short period increases of the cost of capital goods and by the general analysis developed in the chapter, where the attention is focused on the long term effects of accumulation. Nevertheless, in the second of the paragraphs just mentioned, we find a reference to an environment where the capital equipment is given which would be more akin to a short period analysis. This reference may be explained as part of a 'dynamic' depiction of the economic activity, where, at any moment, everything is fixed -and this would be consistent with his representation of capital and of technical change-, except the ability of the people to modify the environment by means of their labour.

On the other hand, the reference to labour as "the sole factor of production operating in a given environment of technique, natural resources, capital equipment and effective demand" (GT p.214) associates Keynes with those writers, such as Knight, who argued against the use of the concept of roundaboutness as a measure of the quantity of capital on the ground that labour is always applied to the production process in conjunction with capital equipment and never, as the concept of roundaboutness implied, without any support of capital goods.

A third problem is raised by the identification of the preclassical doctrine which Keynes appreciates. Should we relate it to Adam Smith, who is elsewhere presented as 'the forerunner of the classical school' (GT ch.23 p.361 n.1), or to earlier writers? Certainly, the idea that 'everything is produced by labour' is not at variance with Ricardo's theory; hence he could be included into the category of the 'preclassical economists'. But the idea that the available capital goods -a product of past labour- "command a price according to their scarcity or abundance" is at variance with his theory, while it is consistent with Smith's one.

A further note on this subject may be added. During 1934, Keynes replaced, in the paragraph we are considering, the term 'classical', which appears in the earlier available draft of GT (CW XXIX p.116), with the term 'pre-classical' (CW XIII p.454). Approximately at the same time we find Keynes' first reference in print to 'the classical doctrine' (Hutchison 1978 p.124); this reference is contained in the lecture 'Poverty in Plenty: Is the Economic System Self-Adjusting?' where the term 'classical' identifies those

economists who regarded self-adjustment as a property of the economic system (1934 CW XIII p.489). All the same, the reference to 'the pre-classical doctrine' at GT p.213 does not appear to be accurate, but it would be interesting to understand, at least, to whom Keynes was referring with the expression 'classical' he previously used.

V. The period of production

1. The discussion of the concept of scarcity as an explanation of the yield of capital develops in an obscure way, using concepts almost completely foreign to the rest of the book. In its middle Keynes reaffirms his commitment to the scarcity theory and draws a path for the development he is pursuing: "A correct theory, therefore, must be reversible so as to be able to cover the cases of the marginal efficiency of capital corresponding either to a positive or to a negative rate of interest; and it is, I think, only the scarcity theory outlined above which is capable of this." (GT pp.214-5).

Even if it is submerged by the discussion, this is a strong statement: only the scarcity theory is a correct theory of the yield of capital.

The analysis of the situations in which the marginal efficiency of capital (mec) and/or (in this hypothetical reasoning they do not have to coincide) the rate of interest could assume positive or negative values is developed before and after the statement just quoted. The case in which the variable considered is the mec will be examined first.

2. To begin the analysis, Keynes takes a stance in the discussion on the effect of continuous increases in the capital intensity of production. He believes that a point will be reached where further increases in the capital intensity -or roundaboutness- add nothing to the product, but imply a negative contribution.

By taking this position Keynes introduces into the discussion the concept of roundaboutness which was previously absent and must be regarded as a measure of the capital intensity of production. This concept was not used in his previous outline of the scarcity theory and will not reappear, in GT, with the same meaning, whereas the concept of capital is further used in the shape of individually specified capital goods. Such occurrence justifies the description of the use of the concept of roundaboutness as an attempt to show the greater generality of his theory -or simply its generality-, rather than as an adherence to the theory of capital implied by that concept.

Keynes' argument proceeds in this way: given the labour force, he considers a case in which "the desire to postpone consumption were strong enough to produce a situation in which full employment required a volume of investment so great as to involve a negative marginal efficiency of

capital" (GT p.214). The desire to postpone consumption - whose unusually high level is the first cause of this extreme situation- may be interpreted as a desire to save, which consists of "abstaining from present consumption" (GT p.210), but it is open to doubt if Keynes also intends with it 'placing an order for future consumption' -an assumption which he regards as unjustified at GT pp.210-1. The negative value of the mec which ensues from this situation may be explained through the scarcity theory previously outlined.

Under these conditions "we should employ physically inefficient processes provided [that] they were sufficiently lengthy for the gain from postponement to outweigh their inefficiency" (GT p.214), or, alternatively, shorter and more efficient processes. According to Keynes, "we should in fact have a situation in which short processes would have to be kept sufficiently scarce for their physical efficiency to outweigh the disadvantage of the early delivery of their product." (GT p.214). This statement can be explained in the following way. If the demand for the product is expected to take place at a given distant time (or at a given time rate, which, in a continuous flow of economic activity, is the same thing and places a satisfactory interpretation on the expression 'desire to postpone consumption'), then to produce at full capacity using 'too efficient' processes would generate, at each point of time, a supply greater than the demand expected to be able to pay a positive rate of profit, hence -to avoid a glut and the subsequent fall of prices- the too efficient processes have to be kept scarce, i.e. the economy must not run at full employment level. At this stage it would be indifferent, in terms of prices, if the economy adopts a physically inefficient process -which should be a paradoxical case- or a physically efficient process kept adequately scarce -in which case full employment could not be granted.

However convoluted, this appears to be an extreme example of the greater generality of the scarcity theory of yield, as the concept of roundaboutness describes only one of the two options (situations characterized by positive or negative values of the mec) which the scarcity theory is capable of examining. On the other hand, it must be noted that the concept of roundaboutness -traditionally developed as a measure of the degree of capital intensity- is treated by Keynes in a restricted fashion as a measure of the length of time which elapses between the decision to produce and the availability of the product, rather than in accordance with its original meaning.

3. The second part of the discussion considers the same situation, except that the variable whose value is given is no longer the mec (through the links of consumption postponement and full employment maintenance), but the rate of interest; now no direct cause is indicated to explain these particular values.

"If the rate of interest were zero, there would be an optimum interval for any given article between the average date of input and the date of consumption, for which labour cost would be a minimum" (GT p.216); both shorter and longer processes would be less efficient. In this case the period of production is defined in accordance with the Austrian school.

If the rate of interest exceeds zero, a new element of cost is introduced and to cover it the output has to be reduced -increasing the scarcity yield- and a less efficient, but shorter, method of production has to be adopted. "...if the rate of interest falls below zero (assuming this to be technically possible), the opposite is the case" (GT p.216), but now the scarcity effect does not turn out to be crucial (2). We could attempt to superimpose these cases and those considered in the previous paragraph 2 (mec or rate of interest greater or smaller than zero), but it would not be consistent with the argument developed by Keynes and it would induce the idea that the mec can determine the rate of interest (the first situation causing the second), while in Keynes only the opposite sequence can take place.

Whereas in the case of a negative value of the mec the adherence of Keynes' definition of roundaboutness to the proper 'capital intensity' definition was extremely dubious, in the second case the concept is much more close to the 'Austrian economists'. Anyhow, he can show that his theory has such a degree of generality as to encompass that concept, even if it is not necessary to its development. But having properly introduced and accepted the concept of roundaboutness and its working (i.e. its relation with the rate of interest) he has introduced a kind of clockwork mechanism that seems to be bound to emerge in full autonomy, notwithstanding the negative comments that he often expresses -as we shall see in the next paragraph- on the Austrian school. Actually we can see this emergence in the lecture on the economic consequences of a declining population.

4. At this stage it is useful to consider briefly the hints we can find which clarify Keynes' understanding and intended use of the concept of roundaboutness.

In GT the only reference to the period of production as an average of the length of time for which the inputs remain invested is the one we have just referred to (GT p.216). The other references are more or less explicitly concerned with an absolute length of the period of production, that is with the time which elapses between the moment when the first input is fed into the process and the emergence of the output. The definition of the concept -presented at GT p.287- is consistent with this 'non orthodox' view. Another reference is intended to stress the lack of clarity of the Austrian school on this point (GT p.76).

In the other writings connected with GT the concept of

period of production generally appears as an absolute length or, again, to stress its lack of clarity ("God knows what the Austrians mean by 'period of production'. Nothing, in my opinion. Vide Knight's article in the forthcoming March E.J." (CW XIII p.517)). The two sole exceptions are the already mentioned lecture 'Some Economic Consequences of a Declining Population' (CW XIV pp.124-33) and an undated paper (CW XXIX pp.155-7) where an attempt is made to work out the meaning of the period of production in terms of aggregate output and capital, but which is heavily veined by scepticism.

All this implies a certain amount of misunderstanding and an inclination, on Keynes' part, to adapt the concept (as Robertson suggested; CW XIII p.507) to his own categories and purposes. In any case, as Kaldor's review of the matter shows (Kaldor 1937), the debate on the concept of period of production, in the 1930s, was very confused and far from reaching a general conclusion on the legitimacy of the concepts and relations involved; from this point of view, Keynes' arguments may be regarded as contributions to the contemporary discussions on the same level as many others.

A confirmation of our interpretation of Keynes' opinion on the concept of length of the period of production, of the passages of GT ch.16 discussed above and of Keynes' position with reference to the debate just mentioned comes from a note in GT ch.14 (The Classical Theory of the Rate of Interest) where Keynes refers to one of Knight's articles on capital theory published in the 1930s (Knight 1934) Keynes describes that article in these terms: "[it] contains many interesting and profound observations on the nature of capital, and confirms the soundness of the Marshallian tradition as to the uselessness of the Bohm-Bawerkian analysis" (GT p.176 n.3). This passage, compared with the argument developed in Knight's work, strengthens our interpretation of Keynes' position on the concept of roundaboutness as encompassed in his more general scarcity scheme. In fact, Knight presents the Bohm-Bawerkian analysis of the concept of capital as a sort of oversimplified view of capital; this view is contrasted with the 'discounted value' approach which allows to include in the treatment of capital a much larger range of aspects. Knight links the development of this alternative approach to the works of I.Fisher (Knight 1934 p.277 n.1); Keynes -who regards Fisher as the first who has introduced the concept of mec- identifies this approach with the Marshallian tradition (his quotations (GT p.188) from Marshall's Principles can support such contention) and connects himself to that tradition; in this way he provides to his view a support based on the ground of the history of economic thought. It is worth noting, in this connection, that Keynes does not refer to a 'theory' of capital opposed to the Bohm-Bawerkian analysis, but to a 'tradition'; this term, even if not necessarily opposed to 'theory', might be intended to express the conviction that that tradition was

not developed into a thorough theory, as he had clearly stated in his 1931 reply to Hayek, s review of his TM (Keynes 1931 p.253).

VI. The lecture at the Eugenics Society

1. The lecture 'Some Economic Consequences of a Declining Population' (1937a CW XIV pp.124-33), as it provides the only example where the concept of period of production is used as a measure of the quantity of capital and plays, at the same time, a central role in the reasoning, deserves particular attention.

In this lecture -delivered in the early months of 1937- Keynes considers some of the potential effects on the level of prosperity of a country like Britain of a declining population, as was predicted in those years.

As an increasing population exerts a positive influence on the demand for capital, a trend of declining population would negatively affect -through the demand for investment and related ways- the level of activity and of prosperity (CW XIV p.126). Another two causes that Keynes indicates as responsible for the demand for capital goods are the standard of life and the capital technique (CW XIV p.126; in the same page we also find the definition of period of production).

What is relevant to our inquiry is Keynes' treatment of the last two variables. He regards an improvement of the standard of life at a pace higher than 1% per year as 'not practicable' (CW XIV p.130), mainly because we cannot adjust ourself to such a pace. Hence, to avoid 'the devil of unemployment' we must rely on the other variable, represented by the length of the period of production, and on its sensitivity to the value of the rate of interest.

2. With reference to GT this position produces two points of contrast. First, it gives a degree of autonomy and relevance to the concept of capital intensity which appears as a complete novelty. Second, it disregards the link between rate of interest and scarcity of goods which occupied a central position in GT ch.16; at its side, with a major prominence, is placed the link between rate of interest and capital intensity. Both of those links would allow us to reach prosperity, but the first one would afford not only full employment (which must be taken as an aspect of prosperity), but also a too large and quick social change; if we are to maintain the scarcity theory outlined in GT, such a social change would imply, among other things, a higher real wage and a lower rate of profit. The other link, taken on its own, would imply a decrease in the rate of profit (non comparable to the previous one) and an increase in the real wage -if any- lower than in the other case (otherwise there would be no point in following this way).

In GT there was no choice between the two paths and the second was in a kind of subordinate position with respect to the first. If a choice has now to be possible to the firms, a mechanism should be indicated to allow it; but what happens is that the scarcity relation is simply disregarded and the rate of interest appears to be able to influence only the second kind of choice (i.e.: the capital intensity of the technique). So we have an empty space in the rational chain which should connect the analytical structure of GT and that of this later essay.

3. A note should be added to this discussion. As we have seen, in this lecture, Keynes resorts to a relation between the length of the period of production and the rate of interest. But, according to the estimations he provides, we can get no support from the experience of the past to rely on the effectiveness of that relation, although Keynes does not draw this conclusion. In fact Keynes' estimated long period average of the rate of interest is fairly constant over the period 1840-1913 (CW XIV p.128); the estimated 10% lengthening of the period of production, during the same years, should be attributed to technical innovations. Hence, the advice given by Keynes in relation to the management of the rate of interest to cope with the effects of a declining population seems to be based on a highly speculative ground. On the other hand, it can be recognized that the outcome of a full employment policy based on the 'scarcity relation' between rate of profit and real wage would be -for different reasons- equally uncertain.

VII. The own rates of interest

1. The discussion developed in GT ch.16 is used as a basis for the analysis carried out in ch.17. The link between the two chapters is twofold. On one side, it is established by the explanation of the return on capital goods. On the other side, a justification is now provided for the peculiar role of the rate of interest on money in setting "a standard to which the marginal efficiency of a capital asset must attain if it is to be newly produced" (GT ch.17 p.222) which was suggested in ch.16.

For the present concern it will be relevant to examine ch.17 only with reference to the description of capital and of its return.

2. Keynes considers the rate of return -or of interest- of each commodity expressed in terms of itself, as determined by the prices for current and future delivery or, in what he regards as the most general treatment (CW XIV p.76), by the combination of yield, carrying cost and liquidity premium, all measured in terms of the commodity in question. Money is treated as one of the commodities

available in the economy, but with its own, peculiar, characteristics (this treatment of money may be regarded as inspired by Sraffa's depiction of the role of money in the economic system (Sraffa 1932 p.44) and consistent with Keynes' own declaration (1933 CW XIII p.408) of the foundations of a theory of a monetary economy). All capital goods are 'individually' treated; that is, they are treated with reference to the whole economy and not to an individual firm (a macroeconomic level), but without any aggregation between different goods. This treatment is exactly the same as that followed, in GT ch.11, to define the schedule of the marginal efficiency of a given capital asset and, in GT ch.16, to discuss the origin of the yield to capital assets. A slight difference between ch.17 and ch.16, in this connection, might lie in the fact that, within the scarcity scheme, capital goods appear to be always all simultaneously considered, while in ch.17 it might appear more ambiguous, at some points, if the centre of Keynes' interest is a simultaneous consideration of all the capital goods -in a comparison between permanent positions- or an isolate consideration of each one of them -in a partial equilibrium analysis; notwithstanding this observation, Keynes' main argument seems to follow the same path in GT ch.17 as in GT ch.16.

3. The first question to be answered, to develop our analysis, is whether Keynes is dealing with long or short run phenomena.

With reference to capital goods, the answer seems to be quite clear: Keynes considers their 'normal' prices (GT p.229) and discusses the effects of their greater availability on their rate of return (GT p.230); both of these references appear to be meaningful only within a long run context. The reference to 'expected returns' that we find at p.226 does not imply that the analysis is limited to short period expectations; it rather implies that the same categories may be applied to both long run tendencies and short period movements.

The question is more intricate when we consider the rate of interest on money. Certainly, to assure consistency, it should be referred to the same time context as the rate of interest on commodities; but a problem of Keynes' analysis is exactly the lack of a theory of the long run -or normal- rate of interest on money. To avoid this problem it could be argued that in this chapter the object of inquiry is not the absolute level of the rate of interest, but its behaviour in response to the influence of the properties which define the commodity 'money'. As long as these properties may be regarded as permanently exerting their influence and not being dependent on short run disturbances or expectations, we can regard also the treatment of the rate of interest on money as developed within a context of long run analysis (or permanent positions analysis), even if this does not rule out the possibility -as in the previous

case- of using the same analytical structure to study short period situations.

4. With respect to the treatment of capital goods -as already stressed- no important difference is introduced in comparison with ch.16. The own rate concept is a novelty, but the reason for the decline of the return on capital goods is linked to the analysis of ch.16 (GT ch.17 pp.228, 230). In fact, the same matter may be treated in terms of mec, own rates or demand and supply prices.

5. Notwithstanding that the discussion of capital goods presented in ch.17 is just a different aspect of the scheme based on demand and supply prices or mec, it suggests a way of interpreting Keynes' treatment of capital goods which was not so evident in connection to the previous presentations. This new interpretation would depict the return and quantity of the individual capital goods as regulated through a Walrasian process of equilibrium determination.

A Walrasian interpretation might be supported for the lack of reference to concepts of 'capital intensity', which are ruled out by the statement that "if capital becomes less scarce, the excess yield will diminish, without its having become less productive -at least in the physical sense" (GT p.213). But in GT one cannot find more than a hint in such Walrasian direction.

In fact, a Walrasian view could be accepted as a broad description if we considered only capital and consumption goods (disregarding the problems raised by the concept of marginal propensity to consume and by the distinction between 'notional' and 'effective' demand schedules). But we should be able to introduce money and, in a Walrasian scheme, money -with the possible exception of relatively recent elaborations- plays no proper role, while the role of money was exactly one of Keynes' main concerns and the fundamental theme of GT ch.17.

Moreover, another fundamental problem faces a Walrasian interpretation. In the case of fixed coefficients of production, which would better describe Keynes' analysis, the determination of uniform rates of profit and wage -that is the determination of a uniform rate of return to capital goods and to the other factors employed- depends on the option open to the consumers to choose among different consumption goods and to substitute one for another so as to obtain the greatest utility with a given income (Garegnani 1960 p.206). But the statement of this hypothesis is completely absent from Keynes' brief description of his 'scarcity theory'. To answer this objection it could be argued that such an assumption might well have been implicitly made, as it amounts to nothing more than a fundamental proposition of the microeconomic theory of the consumer's behaviour. Nevertheless, we can maintain that we are faced with a system, as we have depicted it in sect.IV of this chapter, which can determine the relevant variables

without recourse to that hypothesis, which -for this reason- turns out to be redundant. Indeed, it has been argued that Keynes, in his GT, did escape exactly from the reduction of the macroeconomic phenomena to microeconomic variables (Coddington 1976 p.1271).

VIII. The scarcity scheme with a given level of employment

1. It might appear that the role of the concept of scarcity would not be much different from that of decreasing marginal utility of consumption goods if the system were not allowed to settle in unemployment equilibria. If this would be the case, the conception of capital as technically specified goods could appear as a sort of intermediate step towards the traditional concept of capital as a factor of production rather than as an autonomous conception. In fact, the treatment of capital as given goods and the exclusion of technical change (except as due to technical progress, as it was in TM) would lead to a representation of the process of investment whose relevance would easily be confined to the case of availability of unemployed labour, while the traditional concept would appear as endowed of greater generality because it would be capable of being applied to full employment situations. But, on the contrary, if we combine the concept of scarcity with the conception of capital as technically specified goods, we can develop an explanation of the return to capital independent of the existence of unemployed labour and of technical change.

2. The construction is suggested by Keynes himself who - in GT ch.16 section IV- maintains his usual attitude towards capital goods and investment in a long run context while he considers a case where full employment is continuously preserved through an appropriate management of the rate of interest.

In those passages we find a reference to 'modern technical resources' which could be interpreted as a traditional production function or -in a way which seems to be more close to Keynes' constant reference to capital as given capital goods- as a set of techniques, each of them being currently used and specific to the production of a particular commodity. If we adopt the second interpretation we can exclude from the reasoning a phenomenon of capital deepening which, at least explicitly, is actually absent.

Under the last assumption, the process of investment can be represented as a continuous removal of employees from the production of capital goods to that of consumption goods. This process, as the scarcity is continuously reduced, progressively decreases the profitability of investing, until "the conditions of a quasi stationary community" are reached (GT ch.16 p.220). As the entrepreneurs can use only

the available modern techniques (or technical resources), they would have no other opportunity open to their actions, unless they could create new needs. So the expression "change and progress would result only from changes in technique, taste, population and institutions" (GT pp.220-1) would describe not only the ensuing stationary state, but also the path which leads to it (provided that the assumption of full employment is satisfied). In fact, even if change takes place, it is rigorously determined and no choice is open to the entrepreneurs.

It is worth noting, incidentally, that we are quite distant from both the Harrod-Domar model and the so called neoclassical models of growth.

IX. Rate of interest and relative prices

1. A question which must be mentioned before dealing with the main subject of this section is that of the relations between demand for capital and demand for investment. The problem has been posed in the following way: when we consider the demand for investment goods as a function of the rate of interest, we must be able to justify how it is derived from the function which relates the demand for capital to the rate of interest. Often Keynes has been criticized (Haavelmo 1960 pp.164,173,216; Witte 1963 p.441; Jorgenson 1967 p.133; Ackley 1978 p.63 n.18; -Haavelmo does not refer his criticism directly to Keynes' GT-), with reference to short period analysis, for having erroneously attributed to the determination of the demand for investment causes which would have been appropriately considered only in relation to the determination of the optimal stock of capital which a firm wish to hold; but, within a short run context, it is possible to provide a consistent solution to the problem of the connection between these two orders of demands in Keynes' GT (Naldi 1986 pp.33-4).

2. If we consider long run conditions, the problems due to the derivation of an investment demand schedule from a schedule representing the optimal stock of capital goods is overcome. In fact, the source of those problems -the gap between the time horizons characterizing the decisions concerning optimal stock of capital goods and investment flows- is removed; in this case the previous criticism could be used to question the meaningfulness of an investment demand schedule, but -now- we will not follow this discussion.

Within long run conditions, when we consider an investment demand schedule, we face a different problem due to the dependence of relative prices on the value of the interest rate. To appreciate this issue -that Keynes had already shown (TM ch.13 p.181, 189) to understand, if not to intend to analyse- we can recall the example of old wine and chest presented by Sraffa (1960 p. 37) according to which,

in a system where nothing had changed but the value of one of the distributive variables, the prices of old wine and chest changed their relative order.

Bearing this example in mind, it is clear that the reference to a downward sloping mec schedule within long period contexts, as it happens in GT ch.24 sect.II, is unsatisfactory. Even if the aggregate investment demand schedule constructed by means of the 'scarcity scheme' would represent the relation between a given composite commodity and the rate of interest, once the composite commodity were measured in money terms there would be no general guarantee that the schedule would be monotonically decreasing. Only an appropriate choice of the measurement unit (it should be the same composite commodity) would assure that result, and Keynes cannot be assumed to consider such a special unit. If the investment demand schedule were not supposed to represent a given composite capital good, but a set of commodities whose weights might vary as the degree of satisfaction of the 'needs' varies, then the possibility of establishing a downward sloping curve would be even more remote.

3. On the other hand -and this appears to be the most appropriate solution to the problem- no demand function for capital or investment is really necessary within the scheme which supports the scarcity theory of the yield of capital. In fact, no such function is depicted in GT ch.16 or in ch.17.

The scheme is organized so that once one of the distributive variables is fixed the other is immediately determined, provided that either the level of employment or the composition of output are assumed to be given. As the rate of profit and the real wage (i.e. the degree of scarcity) are given, the quantity of capital goods - specified in both physical and money terms, because also the relative prices have been determined- is immediately known. The level of investment associated to a new value of the rate of interest (or of profit) could be deduced, provided that the problem mentioned above were actually overcome, and a schedule -where investment is expressed in value terms- might be built up; but this construction would be clearly of little use (and not necessarily downward sloping), as all the information we need to direct a full employment policy, as depicted at GT p.220, or to predict the effect on the rate of profit of an additional amount of capital goods employed in the economy, as is the case at GT p.213, is included in the specification of the structure of the system. The schedule of the marginal efficiency of capital turns out to be -in this long run context- merely a verbal device which summarizes the complex procedure implied by the 'scarcity scheme' in a convenient, but -as it has been argued above- analytically unsatisfactory, downward sloping schedule.

4. As it stands, the picture of this system leaves very little room for expectations and for the 'discounted value approach' to the determination of the demand price of capital goods. Their relevance, it could be argued, should be sought in the combination of causal relations which links short and long run positions of a system. The lack of a boundary clearly set to delimit the influence and applicability of these categories might reflect the continuity between short and long run which characterizes Keynes' analysis. A continuity which, nevertheless, does not prevent the extreme, long run positions from being considered on their own, as in the cases we have been discussing.

X. Conclusions

1. A conclusion which can be stated from the argument developed in this chapter is that Keynes really seems to set himself the task of building a theory of the return to capital as an alternative to one based on the concept of productivity.

Keynes traces two origins of the yield of capital goods: their scarcity and their physical productivity. Each of these factors can be used to construct a scale which indicates the yield of given capital goods or of capital in general. As the return to capital is explained through the reciprocal relations between availability of goods, needs and technical abilities of the system, this explanation does not have necessarily to rely on a concept of capital deepening, while the concept of scarcity is presented as essential.

The subordinate role of capital deepening and physical productivity in the explanation of the return to capital is an aspect of the lack of relevance of the concept of capital as an homogeneous factor to be combined with labour in variable proportions. In fact, the most fundamental description of capital is provided in the shape of physically specified capital goods which represent the technique in use. The concepts of capital as a homogeneous factor and of capital intensity appear as a construction of a lower degree of generality because the explanation of the return to capital which would be derived from those concepts is encompassed in the broader conception of Keynes' scarcity theory.

2. Actually, the inclusion of a variable degree of roundaboutness side by side with a concept of given capital goods is not consistent; one of the concepts excludes the other.

Keynes does not devote a special effort to criticize the traditional concept of capital and he elaborates an alternative conception only indirectly. The resulting scheme is ambiguous and open to the possibility of being

developed giving an exclusive relevance to one of the two descriptions of capital, completely abandoning the other. This ambiguity may provide an 'analytical justification' to the abrupt change of categories which we find in the lecture held at the Eugenics Society. But, notwithstanding this ambiguity, the scheme based on the concept of scarcity is an expression of the autonomy of Keynes' view from the traditional concept of capital as a factor of production.

Notes

(1) Incidentally, it can be observed that this amounts to state a theory of wage determination which must be consistently matched with that presented in GT ch.2. A way to proceed in this task could start noting that the theory presented in GT ch.2 refers only to short run situations (GT pp.10, 17).

(2) J.Robinson's comment on this point (CW XIII pp.643-4) is useful to clarify the underlying process.

(3) Capital deepening, with its representation of the production process based on the concepts of homogeneous capital and production functions, might be introduced again by means of the 'older techniques'; the problem would be whether the techniques, once dismissed because of technical progress, are to be regarded as 'stored' in a production function from which they may be resumed through changes of the interest rate or if an alternative conception has to be adopted. Here, again, we reassert the opinion that Keynes' expression does not refer to such a view of the economic process, even if an explicit and detailed discussion of this point cannot be found in Keynes' writings. In any case, even if we opted for the first interpretation, it would be legitimate to explore the possibility of a consistent development of the hints of a treatment of capital, as can be found in GT, autonomous from the traditional theory.

5. The debate on 'finance'

I. Savings, investment and interest rate

1. A crucial point in Keynes' scheme is certainly the determination of the value of the rate of interest on money; particularly with reference to long run analysis. A more thorough reconstruction of Keynes' long period view of the regulation of the economic activity would require the understanding of this crucial element. To this purpose the main reference is the so called 'debate on finance' which took place after the publication of GT.

In this section the core of that debate will be briefly summarized to introduce the discussion developed in the next section, which will focus more directly on the main object of our work.

2. The main issues of the debate on finance were the role of the supply of savings in the determination of the rate of interest and, in general, the theory of the determination of the rate of interest in a context which does not seem to be restricted to the short run.

The following argument is regarded by Keynes as sufficient to exclude the supply of savings from an active role in the determination of the rate of interest. Once an investment has taken place it produces -through a macroeconomic mechanism- the savings necessary to cover itself (1937b CW XIV p.207); hence, the supply of savings cannot be logically regarded as a determinant of the rate of interest through the balance with the demand for savings (the investment demand schedule). The influence of the investment decisions on the determination of the rate of interest would be related only to the amount of cash -which Keynes names 'finance'- which the firms need to bridge the time interval between the decision to undertake an investment and the execution of that investment; in fact, the execution of an investment will generate the savings necessary to cover it. The demand for finance determines the rate of interest on the same footing as -or on a more important footing than- the components of the demand for liquidity examined in GT. The supply of finance may be regulated by the banking system whose importance in the determination of the rate of interest turns out to be stressed even more than in GT.

3. A certain degree of misunderstanding, in the course of the debate, might have been caused by Keynes' method of disregarding the macroeconomic process which equates savings and investment by focussing his attention only on the final equilibrium, as if it were instantaneously reached. In fact, the arguments of Keynes' critics seem to emphasise, at

some points, the deficiencies of an analysis which disregards the time sequence of the processes (Robertson 1937 p.429,430). But the validity of his analysis, in Keynes' contention, is completely independent of that method and of the degree of detail chosen to analyse the adjustment processes; it relies only on the concepts of liquidity preference and marginal propensity to consume and on the newly introduced concept of finance.

The question of the actual validity of Keynes' position is not easy to answer, but to our purpose it can be accepted without further inquiry, while we proceed and consider our central argument.

II. Capital, marginal productivity of capital and rate of interest

1. From the viewpoint of our main concern the debate on finance allows us to cast a clearer light on Keynes' apparently elusive answer -or complete lack of answer, as in the case we have seen in ch.4 sect.3- to Robertson's remarks on the role of the productivity of capital in the determination of the rate of interest; this discussion may improve our understanding of the problem of capital by developing an argument that the reading of GT might already have suggested. Unfortunately, the critical remark on Keynes' concept of scarcity put forward by Robertson in his comment to the galley proofs of GT (CW XIII p.507) is not directly resumed and discussed; but, since also in that case the problem of the representation of capital would have been the core of the contention, we can use the discussion on 'finance' to illuminate that case too.

Keynes, in his article 'Alternative Theories of the Rate of Interest' (CW XIV pp.204-5), subsumed Robertson's point on productivity (Robertson 1936 p.177, 181 n.1) under the heading of the influence of savings on the determination of the interest rate. Robertson, in his reply (1937 pp.428-30), reasserted his point on productivity and followed Keynes in discussing the problem entirely in terms of the relations between savings and investment. By doing so, he confirmed that Keynes' approach to the problem was not elusive or far from his view of the general terms of the contention; in fact, the question posed by Robertson to open his argument provides a direct link to the problems of marginal productivity and of the concept of capital: "Is it or is it not legitimate (for, if legitimate, it is certainly convenient) to assimilate the theory of interest to other branches of the theory of distribution by representing the rate of interest as the price of the use of a certain agent of production?" (1937 p.428).

2. What is enlightened by the discussion is that what separates Keynes' representation of capital from that of Robertson -where capital is a homogeneous factor of

production- is the role of savings in the economic process. As Keynes rejects the role of savings in the determination of the rate of interest, the definition of capital as "a certain agent of production" is emptied of its meaning.

In Keynes' basic scheme a concept of capital as an homogeneous factor is useless, because there is no 'waiting' (free capital plus savings, in Ohlin's definition -1937a p.60) to be compared with. For this reason this conception of capital turns out to be absent from his analysis.

3. The previous result allows us to consider again the question, already touched in ch.4, of the links between Keynes' view on capital and investment and what -in this connection- he calls the 'Marshallian tradition' (GT p.176 n.3).

The common element, relevant in this context, of this tradition -which spans from Marshall to Knight, Fisher and Walras- may be identified in a treatment of capital which gives prevailing importance to its concrete specifications as capital goods. But this kind of approach entails ambiguities and inconsistencies because it combines that representation of capital with a view of the return to capital and of the rate of interest which refers to capital as an homogeneous factor of production. Keynes accepts the first part of that approach, but not the second; and his distinction is clear when he comments upon Knight's 1934 article (GT p.176 n.3).

Having abandoned the part of the theory concerned with demand and supply of capital as a factor of production, the difficulties which affect that kind of analysis are at once overcome and a way is opened to the development of a different approach to the description of the economy.

6. Conclusions

I. Keynes' concept of capital

1. The conclusion reached in the last chapter supports the results of the previous analysis of GT and our disagreement with Lerner's interpretation of the formal basis of the *me*c schedule. Moreover, it establishes a continuity between the hints of Keynes' conception of capital contained in 'The Economic Consequences of the Peace', 'A Tract on Monetary Reform' and 'A Treatise on Money' and the position of GT. In all these books capital is presented as capital equipment, without any further qualification added to define more carefully the concept. What induces the reader to regard that concept as perfectly in line with the traditional view is the link, when stated, between capital and savings; this appears clearly in 'A Tract on Monetary Reform' (pp.28-30) and lies at the bases of Keynes' uncritical approach (following his own expression) to the classical tradition.

When he cuts the link between investment -hence capital- and savings, then his 'capital goods' or 'capital equipment', always mentioned in such a pragmatistical fashion, reveal their potential extraneity to any homogeneous factor of production and may be associated, without inconsistencies, to the new theory of the rate of interest and to the new theory of savings.

2. The scarcity theory of the return on capital goods allows Keynes to provide a general explanation of the process which, in a long run context, determines a uniform rate of return without having to abandon his treatment of capital as technically specified goods; on the contrary, this explanation of the determination of the rate of return on capital goods is consistent with that treatment and provides a necessary support to it. This scheme, as long as it is used in its original shape and is not extended to draw an investment function, does not suffer from the consequences of the dependence of the relative prices of capital goods on the value of the rate of interest for the very reason that no investment function is drawn and the relation between quantities of capital goods and rate of interest is regulated by the scarcity principle. In fact, a schedule relating volume of investment and rate of interest is referred to only in GT ch.11 and ch.24 and not in ch.s 16 and 17. In any case, within the scarcity scheme, a long run schedule of investment demand expressed in value terms is not necessary to the development of the argument.

II. The concept of roundaboutness

1. The sole case in Keynes' works where a position clearly at variance with the interpretation proposed in this essay can be found is the lecture 'The Economic Consequences of a Declining Population', discussed in ch. 4 sect. VI.

While in the case of the passages of GT ch. 16 where the concept of roundaboutness is used we can interpret that usage -even stressing its formal inconsistency- as a way to show the greater generality of his approach with respect to the Austrian view; in the case of the lecture at the Eugenics Society it is certainly impossible to deny that Keynes is exclusively using a conception of capital virtually identical to that of the Austrian school. Nevertheless, it should be stressed that, in the light of the references to the concept of length of the period of production which can be found in GT (particularly relevant to this purpose is the footnote at p. 176 discussed above) and in the writings related to its preparation, the use of the concept found in that lecture turns out to be an exception, which can hardly be taken to represent Keynes' general position.

2. An explanation of the adoption of that scheme in the lecture on the economic consequences of a declining population may run on the lines depicted in ch. 4 above: the simplicity of the representation of capital by means of the length of the period of production is a source of its attractiveness and persuasiveness (even if it is also a weakness of that concept, as Knight argued). This characteristic might have justified an instrumental use: Keynes, without a strong theoretical commitment, might have used that concept to the sole aim of developing the object of his lecture and to assert -in a persuading way- the core of his view, which, with reference to that lecture, could have been characterized as an 'enriched Malthusianism', which is, in principle, altogether consistent with the more complex scarcity scheme discussed above.

III. Autonomy from tradition

1. The proposed interpretation of Keynes' concept of capital neatly opposes Lerner's view of the matter. The position of Garegnani is more difficult to deal with as he does not assert a formal link between the concept of capital as a factor of production and the structure of GT, but only a sort of kinship, which would lead to interpret Keynes' position as virtually identical to that of Knight.

But, if we put aside the lecture delivered at the Eugenic Society, we remain with a construction which is not even loosely linked to the traditional view on capital and that justifies the disagreement with both the interpretations put forward by Garegnani and Lerner (1). The link is cut in the

construction of the mec schedule -intended in its short run capacity, which is not analyzed in this work- and in the justification of the long run diminishing returns to capital goods developed through the 'scarcity theory' of the yield of capital. Moreover, the link is cut by the new analysis of the relation between savings and investment, which leaves investment in the simple position of 'goods', without any necessity of being presented as a homogeneous factor of production whose existence is independent of that of the specific capital goods. The lack of reference to a conception of technical change independent of technical progress completes the scheme. Each of these elements combines with the others to produce a full picture of capital as given capital goods; if one of the elements were absent, the consistency of the whole scheme would be endangered.

Notes

(1) As Pasinetti claims that the construction of the mec schedules refers to short periods only and as he does not extend the analysis of Keynes' investment theory to long periods, his view is out of discussion in this context.

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abbreviations

- C.J.E.: Cambridge Journal of Economics
E.J. : Economic Journal
J.E.L.: Journal of Economic Literature
J.P.E.: Journal of Political Economy
Q.J.E.: Quarterly Journal of Economics

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