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A CRITICAL NOTE ON D. H. ROBERTSON'S  
THEORY OF SAVINGS AND  
INVESTMENT (II)

By HIDEO AOYAMA

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PART 2. THE "FINANCIAL CIRCULATION" AND  
THE METHOD OF PERIOD ANALYSIS

6.

In the previous article, I have explained "period analysis" as a method of analysing the economic changes, especially in its causal aspects. Now, this method is almost exclusively employed in defining the relation Savings-Investment which is very important in the process of economic changes. In order to discuss this application, I will contrast it with the theory which J. M. Keynes develops in *A Treatise on Money* (1930).

The system of fundamental concepts, which Keynes uses in this book and especially in its "fundamental equations", is so famous that I need not recapitulate it here. What claims our attention is, however, all his fundamental notions used here are also defined as the "retrospective" magnitudes, in just the same manner as in his *General Theory of Employment, Interest and Money* (1936).<sup>1)</sup>

So long as this "ex post" point of view, so to speak, is upheld in constructing the conceptual scheme, profit  $Q$  is always identical to the excess of investment  $I$  over savings  $S$ . It is a necessary consequence of the Keynes' definition of income  $E$  and savings  $S$ , by which extraordinary profits

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1) I shall here refrain from any discussion of the way in which Keynes makes use of the so-called "fundamental equations".

are excluded from the contents of income. Applying this unusual concepts, he aims to define savings and investment so that discrepancy between them might occur. In other words, this system of fundamental concepts is adopted in order to give theoretical expression to the fundamental feature of the credit economy that savers and investors are not always identical. But can the significance of this fact be perfectly represented by such conceptual scheme? Can the results arising from the fact that two sets of decisions are formed by two different groups of people be adequately described by a conceptual set which contains no prospective magnitude? It is true that the discrepancy between savings and investment arises from the fact that savers and investors are different, but the market phenomena, which are brought forth, under the influence of given conditions, as the resultant of decisions of various sellers and buyers, savers and investors, do not always actualise what they have anticipated in these decisions. Therefore, the analysis of such mechanism of the market, which is the very object of the economic theory, cannot be accomplished so long as the "ex post" system of concepts is applied, as Keynes does. Criticisms of Keynes' *Treatise on Money* by Hawtrey, Robertson and other scholars are naturally directed against this vulnerable point.

If, however, we re-examine the situation from the point of view of "period analysis", we shall be able to find, in the following way, the key to the solution of this problem. Now suppose that both the public (i.e. savers) and entrepreneurs (i.e. investors) act according to their respective plans, an assumption which period analysis never fails to make in this case. Then, savings  $S$  and investment  $I$ , which are originally defined as retrospective magnitudes, will be then equal to its prospective values and these symbols may be considered to denote prospective magnitudes. If so, profit  $Q$ , which is the excess of investment ex post over savings ex post, can be taken as indicating the disparity between planned investment and planned savings. Then, the discrepancy between the

plan of savers and the plan of investors may be regarded as the cause of profit. Thus, so long as the fundamental assumption of the period analysis that savings and investment are alike carried out according to the plans previously laid down is introduced, Keynes' fundamental equations come to be able to explain not only the size of, but also the genesis of profit. Robertson, in his article entitled "Saving and Hoarding", in *ECONOMIC JOURNAL*, Sept. 1933, attempts to reconstruct, in the above-mentioned way, the theory which Keynes develops in his *Treatise*. In this Part of the present article, I intend, examining this Robertson's reconstruction, to make clear the validity and limits of the method of period analysis, when investment is taken into consideration.

## 7.

Before tracing this Robertson's exposition, I will give a comment on the problem to be dealt with here.

As will be clear from what I have already stated in Part I, period analysis is nothing other than the dynamization of the quantity theory of money, so long as it is employed in the analysis of the process of price changes. I have also made clear in Part I that, in his application of period analysis in his old book, Robertson assumes that money is the only form in which wealth is hoarded. As a matter of fact, however, money is not the only form in which wealth is hoarded. Possessors of wealth can hold wealth "either in the form of money (or the liquid equivalent of money) or in other forms of loan or capital". In other words, not only is money wanted as a medium of bridging time discrepancy between income and outlay, but it is also demanded by bears (that is, by people who prefer cash to securities). We cannot leave the latter kind of demand for money out of consideration in the theory of the variation of prices, because changes in this demand necessarily affect the prices of securities and accordingly the price-level of investment-goods. Herein, as Hicks says, lies "the most important part" of Keynes'

contribution to the theory of money in his *Treatise*.<sup>1)</sup> Now, considering this fact to the bottom, Keynes himself reaches to a noteworthy conclusion that the traditional quantity theory of money is untenable. According to him, "if the volume of saving becomes unequal to the cost of new investment or if the public disposition towards securities takes a turn, even for good reasons, in the bullish or in the bearish direction, then the fundamental price-levels can depart from their equilibrium values without any change having occurred in the quantity of money or in the velocities of circulation."<sup>2)</sup>

The proposition can be made clearer if the Keynes' distinction between "industrial circulation" and "financial circulation" is here used. The former refers chiefly to the deposits which are influenced by the ordinary output and its cost of production, while the latter refers to the deposits which are influenced by "such factors as the state of speculative sentiment" and which depend on "the pace at which a circle of financiers, speculators and investors hand round one to another particular pieces of wealth or titles to such, which they are neither producing nor consuming but merely exchanging."<sup>3)</sup> The deposits falling under the former category include income-deposits and part of business-deposits, while those belonging to the latter category consist of the remainder of business-deposits and savings-deposits. Keynes attaches importance to the savings-deposits which are concerned with the so-called "bear position". He says that "the fluctuations in savings-deposits B are probably the most important element of variability in the demand for money due to finance", and also asserts that "a change in the disposition of the public towards securities other than savings-deposits, uncompensated by action on the part of the banking system, will be a most potent factor affecting

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1) Hicks, "A Suggestion for Simplifying the Theory of Money", *Economica*, Feb. 1935, p. 3.

2) Keynes, *A Treatise on Money*, vol. i. p. 147.

3) Keynes, *ibid.* vol. i. p. 47.

the rate of investment relatively to saving and a cause of disturbance, therefore, to the purchasing power of money".<sup>1)</sup> Thus, in Keynes' opinion, the prices of securities and the price-level of capital goods are the resultant of the sentiment of the public and the behaviour of the banking system. This means that there exists no such definite numerical relationship between the price-level of new investments and the additional quantity of savings-deposits as the quantity theory of money supposes; because "the amount by which the creation of a given quantity of deposits will raise the price of other securities above what their price would otherwise have been depends on the shape of the public's demand curve for savings-deposits at different price-levels of other securities". So long as prices are determined by such relationship of demand and supply, the quantity theory of money is no more able to be valid.<sup>2)</sup>

1) Keynes, *ibid.* vol. i. pp. 252, 144.

2) Keynes, *ibid.* vol. i. pp. 142-143. To the sentence cited here, Keynes adds the following foot-note: "The rate of interest offered by the banking system on savings-deposits also comes in, of course, as a factor influencing their relative attractiveness". It is clear that the proposition in the text may be graphically represented by Fig. 1. In this figure, the additional quantity

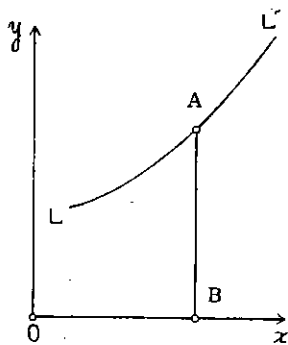


Fig. 1.

of savings-deposits created by banks is measured along the  $x$ -axis and the prices of securities along the  $y$ -axis; the curve  $LL'$  represents the public's demand curve for savings-deposits. Now, according to Keynes, "the price-level of investment as a whole, and hence of new investments, is that price-level at which the desire of the public to hold savings-deposits is equal to the amount of savings-deposits which the banking system is willing and able to create". Therefore, when banks create the additional quantity of savings-deposits to the amount of  $OB$ , the prices of securities are determined to the height of  $AB$ , where  $A$  is the point at which the straight line vertical to the  $x$ -axis at  $B$  crosses the curve  $LL'$ . The proposition may be more easily understood when the curve  $LL'$  is regarded as the supply curve of illiquid assets and the quantity of demand for illiquid assets is measured along the  $x$ -axis. From this it will be clear that the demand for and supply of illiquid assets is here quite differently constructed from what the period analysis supposes about supply and demand. Therefore the quantity theory cannot be applied in the manner of period analysis. This point of view was stressed by Keynes in his controversy with Robertson (*Economic Journal*, Sept. 1931) and it was, as is well known, finally developed into the "Liquidity Preference Theory of the Rate of Interest". (See also, *General Theory*, pp. 173-174).

The theory of money has been evidently enriched by Keynes' introduction of the financial circulation into its framework. It is also certain that this contribution of Keynes will become more complete, if the Robertson's attempt to remedy the above-mentioned defect in it by the method of period analysis makes success. But such attempt seems to be impossible. Taking the financial circulation into consideration, Keynes is necessitated to oppose the quantity theory; if so, is it possible to reconstruct it by means of period analysis which is inherently based on the quantity theory of money?

The answer to this question is partly in the affirmative and partly in the negative. Keynes' fundamental equations supply the ground for the affirmative answer. Keynes himself admits that his fundamental equations concerning the price-level of consumers' goods  $P$  or concerning the price-level of output as a whole  $\Pi$  are variants of Fisherine type of quantity equation. So long as Keynes derives his equations from the quantity theory in such a manner, Robertson's point of view on the basis of quantity theory is compatible with Keynes'. But, when Robertson applies the "rigorous Fisherine concept of a certain flow of money in a given time-interval meeting a certain flow of goods in the same time-interval"<sup>1)</sup> to the price-level of new investment-goods  $P'$  also, we cannot but conclude that Keynes and Robertson differ in the fundamental points; because, according to Keynes' theory, changes in the financial circulation affect the rate of investment in a variety of ways, the price-level of new investment-goods moves in parallel with the prices of securities, and therefore, his denunciation of the quantity theory in regard to the prices of securities applies alike to the determination of the price-level of new investment-goods. Thus, there exists a fundamental difference between the viewpoint of Robertson and that of Keynes.

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<sup>1)</sup> Robertson, "Mr. Keynes' Theory of Money", *Economic Journal*, Sept. 1931, p. 401.



As they are thus fundamentally opposite to one another, the propriety of their viewpoints must be decided by the comparison of the usefulness of each theory for the explanation of actual facts. In fact, two argue in this way. Now, the central problem, about which they argue, concerns the explanation of the fact that the price-level of consumers' goods and that of new investment-goods changes independently of each other. According to Keynes, when the producers of consumers' goods sell their securities to savers in order to compensate for their losses in case they suffer losses through a fall of the price-level of consumers' goods due to excessive saving (that is, when the so-called "distress sale of securities" takes place), the price-level of new investment-goods rather remain unchanged instead of rising to counteract the fall of the price-level of consumers' goods. Keynes explains this fact by the consideration that these two price-levels are determined by the factors which are independent of each other—the factor of excessive saving and the factor of excessive bearish sentiment. The fact to which Keynes aims to refer here is none other than the phenomenon which Robertson calls "abortive lacking" in his *Banking Policy and the Price Level* or "hoarding". Keynes has analysed this phenomenon of abortive lacking a step further by taking account the distress sale of securities and by indicating the movement of hoarded money. But taking account of the bearish sentiments or the propensity to hoard, he is led to an entirely new point of view, as stated above. As for Robertson, he applies to this case just the same method as he used first in his previous book, *Banking Policy and the Price Level*, and attempts to explain this independent movement of two price-levels monistically (not dualistically, as Keynes does), (1) making clear causal relationship by means of the method of period analysis, (2) defending the quantity theory of money and (3) revising the concept of "hoarding" so as to bring it into accord with the enlarged scope of problem. I shall now comment on this Robertson's attempt from my own point of view.

## 8.

As the method of period analysis is applied here, assumptions enumerated in Section 2, namely, (1) the assumption regarding the unit period, (2) the assumption regarding the anticipation that the same prices as those which ruled yesterday rule today, (3) the assumption that the supply curve is perfectly inelastic and that outlay for goods (no matter whether they are consumers' goods or producers' goods) is made exactly as planned, irrespective of changes in prices, (6) the assumption that the "income disposable" today is equal to (or identical with) the "income received" yesterday and consequently the assumption that today's "Savings" means the excess of the income disposable today over the today's planned expenditure for consumption (or actual expenditure for consumption) hold good in this case also. But the assumption (4) in the same Section must suffer a radical revision as a result of the introduction of durable capital goods and securities into the scope of the problem. The members of community are divided into two classes, viz. the public and entrepreneurs, to begin with, and the latter are further subdivided into the producers of consumers' goods and the producers of new capital goods.<sup>1)</sup> The total amount of the normal income of all members per "day", represented by  $E$ , and the normal income of each class do not change in the process of short-term changes under discussion. Although the public actually receives the income equal to the normal income, the actual income of entrepreneurs lack the attribute of this equality. Their rewards can depart from the normal income to the extent of profit or loss. This distinction between the public and entrepreneurs is simply copied from Keynes' distinction. The following assumptions are further laid down in order to reconstruct Keynes' theory,

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1) The producers of old capital goods are left account, in order to make the treatment correspondent with that of Keynes. Dealers in securities, company promoters and purveyors of various kinds are also excluded for the sake of simplifications.

as it is.

(1') The old assumption concerning induced lacking (5) is discarded. (2') The period of circulation of money is taken as the unit period. Symbolically,  $K=1$ . (3') It is assumed that the output of consumers' goods and capital goods is constant. The former is denoted by  $T'$  and the latter by  $T''$ . (4') The productive expenditure of enterprises is assumed to be invariable both as regards the production of consumers' goods and about the production of new capital goods. The former is denoted by  $E_r$  and the latter by  $I'$ . Each includes the normal reward for entrepreneurs and  $E=E_r+I'$ . Consequently, we can regard profit not only as the excess of the actual reward over the normal income, but also as the excess of revenue over expenditure. (5') When entrepreneurs have incurred losses, they make up these losses by the sale of their securities. They do not curtail the production, when the demand for their products decreases.

With the aid of these assumptions new investments and the circulation of securities are brought into the scope of problem. Indeed the way of introducing them is quite artificial, but most of these restrictions are attributable to Keynes' theory itself, however. They are no means essentially unavoidable in period analysis; their elimination is rather desirable from this point of view. Lastly, in this case also, the starting point is in a stationary state. In this no-profit state, expenditure for consumption ought to be equal to  $E_r$  and the demand for new capital goods to  $I'$ . Accordingly, the equilibrium price-levels of consumption goods and new capital goods are  $\frac{E_r}{T'}$  and  $\frac{I'}{T''}$  respectively. Either profit or loss can occur when and only when the actual price-level departs from this price-level.

For the convenience of analysis, we shall use following symbols:

$e(t)$  = *Income* during "t" day,

$c(t)$  = *Consumption Expenditure* during "t" day,

$i(t)$  = Investment Expenditure during "t" day,  
 $s(t)$  = Saving during "t" day,  
 $p'(t)$  = Price-Level of the Consumers' Goods on "t" day,  
 $p''(t)$  = Price-Level of the New Investment-Goods on "t" day,  
 $y(t)$  = Sales of Securities during "t" day for the liquidation of the losses of entrepreneurs.<sup>1)</sup>

Now, our fundamental problem is to clarify the dynamic mechanism of the formation of the price-levels of consumers' goods and new capital goods. As to the price-level, it is self-evident that we get the following relationship:

$$(31) \quad \tilde{c}(t) = \tilde{p}(t) \cdot T',$$

$$(32) \quad \tilde{i}(t) = \tilde{p}''(t) \cdot T''.$$

The equation (31) corresponds to Keynes' formula:  $E - S = P \cdot R$  (to be more exact, it corresponds to  $(E + Q) - (S + Q) = P \cdot R$ ) and the equation (32) is equivalent to Keynes' formula:  $I = P' \cdot C$ . For Robertson who uses the method of period analysis, however, it is important that the determining factors of prices should be sought in the decisions of members of the community and in unexpected changes in given conditions. Now, in the formulae (31) and (32), the determining factors of prices are retrospective magnitudes,  $\tilde{c}(t)$  and  $\tilde{i}(t)$ , which can be easily rewritten in terms of prospective magnitudes. That is, the total outlay for consumers' goods is equal to the planned expenditure for consumption of the members. Symbolically,  $\tilde{c}(t) = c(t)$ . Now, the planned consumption  $c(t)$  is equal to the "disposable income" on the  $t$ th day  $e(t)$  minus the planned savings  $s(t)$ . Thus, we obtain,

$$(33) \quad e(t) - s(t) = \tilde{p}(t) \cdot T''.$$

In exactly the same way, we obtain,

$$(34) \quad i(t) = \tilde{p}''(t) \cdot T'',$$

1) The symbol  $\sim$  has the same meaning as that attached to it in part 1. Our notations relate to those of Keynes as follows:

$$\begin{aligned} \tilde{c}(t) &= P \cdot R + I = E + Q; & \tilde{c}(t) &= E - S; & \tilde{i}(t) &= I; \\ \tilde{s}(t) &= (E + Q) - P \cdot R = S + Q; & T' &= R; & T'' &= C. \end{aligned}$$

because the purchasing power of new capital goods is equal to the planned investments  $i(t)$ .

Now, Robertson proceeds to analyse changes in the price-levels by means of (33) and (34). As is his wont, he uses the day-to-day method of analysis. Moreover, variables are minutely classified and detailed assumptions are added. Though elaborate, his analysis is very complex. As we have already given the method of generalizing his step-by-step method of analysis, I will here describe his analysis in as general a way as possible.<sup>1)</sup>

Now, from the assumption (6) concerning income, we obtain

$$(35) \quad e(t) = \bar{e}(t-1).$$

Further, having taken the fact of the "distress sale of securities" into consideration by following Keynes' example, we obtain

$$(36) \quad E - e(t) = y(t),$$

where the left side represents the excess of the normal income over the anticipated income, that is, the anticipated loss according to its above-mentioned definition, while the right side represents the planned amount of securities for sale. Thus, the equation (36) implies that entrepreneurs intend to sell securities to the amount large enough to cover the anticipated loss. On the other hand, the actual income of the members is shown by

$$(37) \quad \tilde{e}(t) = e(t) - s(t) + i(t)^2.$$

1) Cf. Robertson, "Saving and Hoarding", *Economic Journal*, Sept. 1933. p. 403 et seq.

2) The reason for this is as follows: According to the assumption that the circulation period of money is equal to one day, the "income received" on the  $t$ th day ought to be equal to the total outlay of the day (or the sum of the actual consumption of the day  $\bar{x}(t)$  and the actual investment of the day  $\bar{z}(t)$ ). Symbolically expressed,  $\bar{z}(t) = \bar{e}(t) + \bar{i}(t)$ . Now, if the quantity of money is constant, the actual consumption of today is equal to the today's amount of planned consumption  $e(t) - s(t)$  and today's actual investment is equal to the today's amount of planned investment  $i(t)$ . Symbolically expressed,  $\bar{e}(t) = e(t) - s(t)$ ;  $\bar{i}(t) = i(t)$ . Thus the equation (37) shows how the "income received" today comes about.

Now, the loss of entrepreneurs,  $E - e(t)$ , must be covered by the sale of securities. Now, will this process go well? Is there sufficient amount of demand for securities? From the equations (36) and (37), we obtain

$$(38) \quad E - \bar{e}(t) = s(t) + y(t) - i(t),$$

wherein the right side is no other than "idle money" to be spent for the purchase of securities. Thus, the actual loss of the entrepreneur can be perfectly covered by the actual proceeds of the sale of securities. We represent this by

$$(39) \quad E - \bar{e}(t) = \bar{y}(t).$$

If  $s(t)$  and  $i(t)$  are defined as certain functions of time and if the initial conditions are given, the six equations of (33), (34), (35), (36), (37) and (39), which are independent of one another, are enough to determine the six unknowns of  $\bar{p}'(t)$ ,  $\bar{p}''(t)$ ,  $e(t)$ ,  $y(t)$ ,  $\bar{e}(t)$  and  $\bar{y}(t)$ . Thus, we can trace the changes in the price-level from day to day, beginning with the 0th day. In fact, Robertson does so very minutely, but the conclusion he seeks can easily be drawn in the following way from the above-mentioned analysis.

Let me now consider the case where the investment  $i(t)$  is maintained at the same level as the above-mentioned equilibrium value throughout the process of changes, that is, where

$$(40) \quad i(t) = \bar{i}(t) = I.$$

In other words, where savings  $s(t)$  exceed its equilibrium value, which is equal to  $I$ , savers attempt to hold the excess portion in the form of securities rather than to invest it. On the one hand, the price-level of new capital goods will obviously remain unchanged in this case. On the other hand, the price-level of consumers' goods cannot remain unchanged, provided savings fluctuate in the given way. Here, the phenomenon such as Keynes points out will surely appear, but the above analysis shows that this phenomenon can be explained without affecting the validity of the quantity theory of money.

Indeed, its merit lies in the fact that it is based on

period analysis. In this case, under the assumptions shown in the equation (40), the producers of new capital goods are in the position of neither getting profit nor incurring losses and the public is always rewarded with the normal income. Therefore, only the producers of consumers' goods suffer losses. The amount of their losses are shown by the right side of the equation (38) i. e.  $E - [e(t) - s(t)] - i(t)$ , which represents the excess of the savings in the sense of Keynes' theory  $E - [e(t) - s(t)]$  over investment  $i(t)$ . In this sense, if excess-saving occur, that is, if

$$(41) \quad s(t) + y(t) > i(t) = I',$$

the price-level of consumers' goods falls below equilibrium value, with the result that the producers of consumers' goods incur losses. According to Keynes, the excess-saving is identical with loss, but here the loss is the result which can be explained as caused by the excess of planned savings over planned investment.

Let me now direct attention to the price-level of output as a whole. It is obvious that a fall of the general price-level occurs when, in the above-mentioned circumstances, savings exceed investment. (The price-level of consumers' goods falls and the price-level of new capital goods remains unchanged.) Now, as an experiment let me set aside the assumption (40) and assume that the "distress sale of securities" does not take place. In this case, the flow of money which cannot find its way to securities turns towards the producers of new capital goods to buy them; then there will occur a rise in the prices of new capital goods, a rise which will be big enough to make up the fall in the prices of consumers' goods. This experimental consideration leads us to the conclusion that the cause of the general fall of prices lies in the fact that the flow of the money saved turns towards securities instead of towards capital goods. Robertson gives this cause the term of "*Hoarding*." He defines "hoarding" as the increase of cash-balances in relation to the income (or, in other words, the fall of the income velocity of money.) Because the income declines notwith-

standing that the quantity of money is unchanged, the cause of the fall of prices is attributable to the single cause of "hoarding."

## 9.

I believe that I have now made clear the substance of Robertson's assertion that "the cause and extent of the fall in the price-level on any day can be defined alternatively in terms of the Hoarding done on that day or in terms of the Excess of Saving over Investment on that day." Next, I must subject the contents of this assertion to close scrutiny and then pass final judgment on the validity of the method of period analysis. Since period analysis is used for the dynamization of the quantity theory of money, as has already been shown, we must examine the quantity theory of money itself. Keynes asserts that it is not because it produces an erroneous result but because it does not produce a useful result that he discountenances the quantity theory of money. Will the above analysis be capable of standing this criticism, then? Is the dynamization of the quantity theory of money in terms of period analysis tenable in these cases also, when scope of the problem is so extended that liquidity preference is taken into consideration as a determining factor of the demand for money? I must reply to this question in the negative for the reasons given below in detail.

What is clear from what I have so far stated is that there is a marked difference between Robertson and Keynes in the treatment of credit created. According to Robertson, the deposits to be created are income-deposits or business-deposits and consequently prices of goods are held to rise in proportion to the amount of deposits created. On the contrary, Keynes almost always confines attention to the fact that "the banking system operates in the opposite direction to that of the public and meets the preference of the latter for savings-deposits by buying the securities which the public is less anxious to hold, creating for them additional savings-



deposits which the public is more anxious to hold than before." He regards as the fundamental proposition of the determination of the price of illiquid assets the fact that it is determined by the relationship between the amount of savings-deposits created and the demand curve for savings-deposits. It is certainly to Robertson's credit that he has analysed the effects of the creation of credit in the shape of cash-deposits. But insofar as the creation of savings-deposits is concerned, it seems that Keynes' theory has an advantage over that of Robertson.

Next, in the above-stated Robertson's analysis the prices of securities remain pegged to equilibrium value and the mechanism for determining them is left out of consideration. This is ascribable to the fact that the effects of the demand and supply of savings-deposits on the determination of the price of illiquid assets is overlooked. But it is, from the first, impossible to continue period analysis by taking the relation of the demand for and supply of illiquid assets into consideration. For, as already mentioned, the point of view that the supply of illiquid assets is influenced by their prices can never be reconciled with that of the period analysis. It is nevertheless indisputable that the choice of the form in which wealth is hoarded is influenced by the price of illiquid assets ruling at the time. As Keynes stresses, this is the basic factor in liquidity preference.<sup>1)</sup> If so, this preference cannot be adequately disposed of by the method of period analysis. Although Robertson's analysis deals with the mechanism for determining the price of illiquid assets, it involves the sacrifice of the essential element of this problem. His method cannot be accepted as pertinent.

I have now made clear that the question of the determination of the prices of illiquid assets cannot be adequately dealt with by the dynamization of the quantity theory of money by means of the method of period analysis. The same thing may be said of his treatment of the rate of

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1) Keynes, *Economic Journal*, Sept. 1931. p. 413.

interest, which is the most important factor in the price formation of illiquid assets. Lastly, I must make this point clear. Robertson argues as though the concepts of savings and investment defined on the basis of the method of period analysis can be applied to the analysis of the mechanism of determining the rate of interest, but I must first point out the mistake of this opinion.<sup>1)</sup>

Robertson holds, as most authors do, that the rate of interest is determined by relationship between savings and investment. To borrow his own expression, this process of determination may be represented as follows. In Figure 2,  $DD'$  denotes "the declining marginal productivity of new lendings in industrial uses" and  $SS'$  "the rate of new available savings per atom of time available, that is, after deducting new savings absorbed in financing consumption by Governments or individuals." Then, the rate of interest  $MP$  is determined by the point  $P$  where the two curves cross.

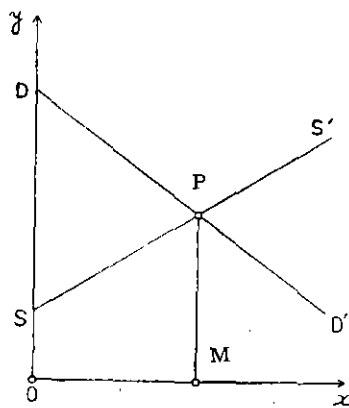


Fig. 2.

But how is it possible to bring into period analysis the fact that the rate of interest actually ruling is determined in this way. Will not this fact rather render the method of period analysis unrealistic? Let me now consider the supply curve of savings. This curve represents that different savings are supplied according as different rates of interest rule in the capital market. In period analysis, however,

savings is viewed as a fixed quantity rather than as the function of the rate of interest. That is to say, according to the construction of period analysis savers at first assume that such and such system of prices (interest may be included) will rule and plan such and such savings on this assumption,

1) Robertson, "Industrial Fluctuation and the Natural Rate of Interest," *Economic Journal*, Dec. 1934.

and actually save so much as neither exceeds nor falls short of that. It makes no matter for the saver, whether he has succeeded in his guess or not. The concept of savings, as defined in conformity with period analysis, is therefore devoid of the working as the determining factor of the rate of interest. The same thing may be said of the concept of investment defined according to the method of period analysis. Robertson clearly confounds this point. In other words, the method of period analysis cannot treat the fact that savings or investment fluctuate according to the rate of interest and that the rate of interest is determined at the level where both are balanced. When period analysis cannot treat this important fact, it shows that its assumptions are not appropriate and accordingly this method is defective.

While bearing the above fact in mind, I will now proceed to examine Robertson's contention that the effects of the interest rate on the price formation of illiquid assets can be analysed without doing violence to the quantity theory. He thinks that this can be done by regarding the rate of interest as "one of the factors affecting the former flow (i. e. flow of money), through affecting the old Marshallian  $K$ —the desire of people to "hoard", that is, to keep command over resources in monetary form instead of embarking on the purchase of goods."<sup>1)</sup> He clearly takes the view that, although the rate of interest is the factor which determines the variables (investment and savings especially) contained in the system used for analysis, it is not a factor determined by them. But this contention ignores the fact that the interest rate always finds its level where savings and investment are balanced. So long as this fact is taken into consideration, it necessarily follows that the interest rate is determined by the variables contained in the system and accordingly the application of period analysis becomes impossible. Can an analysis be perfect which leaves this

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1) Robertson, "Mr. Keynes' Theory of Money," *Economic Journal*, Sept., 1931. p. 404.

notable fact in the capital market out of consideration? If not, it must be said that this very fact makes it impossible to introduce the working of interest into period analysis, in the manner which Robertson suggests, without inconsistency with the quantity theory of money.

#### 10. CONCLUSIONARY REMARKS

My purpose has been to find out how far the method of period analysis is valid when liquidity preference comes into picture. Robertson maintains that the method of period analysis can be applied consistently in this case also and that by the application of this method it is possible not only to trace causally the process of the variation of prices but to demonstrate that the quantity theory of money is by no means impotent as Keynes asserts that it is. As I have explained, however, the structure of liquidity preference is essentially incompatible with the postulates of period analysis and consequently it is impossible to analyse adequately by this method the effects of the interest rate on the price formation of illiquid assets and accordingly of the commodities generally. The method of period analysis has its merits as a means of analysing the process of the change of the value of money and this may well be emphasized especially at against Keynes' theory, but it must at the same time be admitted that its validity has its limits as a method of analysing the change of the value of money.