

Berry, R. Albert

**Working Paper**

## Aspects of the Optimal Interest Rate

Center Discussion Paper, No. 138

**Provided in Cooperation with:**

Yale University, Economic Growth Center (EGC)

*Suggested Citation:* Berry, R. Albert (1972) : Aspects of the Optimal Interest Rate, Center Discussion Paper, No. 138, Yale University, Economic Growth Center, New Haven, CT

This Version is available at:

<https://hdl.handle.net/10419/160068>

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ECONOMIC GROWTH CENTER

YALE UNIVERSITY

Box 1987, Yale Station  
New Haven, Connecticut

CENTER DISCUSSION PAPER NO. 138

ASPECTS OF THE OPTIMAL INTEREST RATE

R. Albert Berry

April 18, 1972

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## Aspects of the Optimal Interest Rate : . . . . .

R. Albert Berry

In recent years it has been practitioners' conventional wisdom that interest rates in less developed countries should be low; this means in practice "below equilibrium" rates, if it is assumed that the marginal productivity of capital and the demand for credit are high, as appears generally to be the case. Public credit agencies are particularly prone to such policies towards agriculture, low income housing, and some other sectors. In some cases restrictions placed on private sector interest rates have a similar effect, e.g. such such Government regulations as interest rate ceilings; the extent of inflation-- which may make it difficult to achieve a reasonable real rate of interest because the nominal rate corresponding to it looks so high, and the agility of the banks in applying side conditions which raise the effective rate of interest above the nominal one (such as minimum balances and so on), determines the extent to which the private sector is also characterized by below equilibrium rates of interest.

The wisdom of these policies is obviously open to question, and in recent years several countries have given them up, with apparently positive results. The whole problem warrants careful thought in any developing country.

The argument usually presented in favor of a below equilibrium interest rate is that it is required to stimulate investment, given the risky nature of investment in less developed countries, the possible risk aversion of entrepreneurs, and so on. There are also arguments not arguing for a generally below equilibrium rate but for a policy of maintaining selected rates below equilibrium, where it is thought that a given industry has external economies,

higher private than social risk, or some such characteristic. In such cases the argument would imply that, although the interest rate should be below the overall equilibrium for these sectors, for others it should be above it. With such an argument there can be no quarrel in principle. But the argument for an overall below equilibrium rate, which is usually the result of some sub-sectors maintaining such rates, appears to have little theoretical or practical defense. The argument is simple; where the total amount of savings is a positive function of the interest rate paid to savers, then unless the government itself subsidizes the recipients of the below equilibrium interest rates--paying a higher rate or allowing a higher rate to be paid to savers than is paid by borrowers, then the interest rate savers receive is below equilibrium, with the result that total savings and, corresponding, total investment will be decreased. This loss can be seen in Figure 1, where the equilibrium interest rate  $R_e$  would correspond to an amount of savings  $S_e$ , but where the interest rate is maintained at the below equilibrium level  $R_o$ , so the total amount of savings is only  $S_o$ . Since investment is equal to savings, it is naturally less with a lower interest rate than with a higher one; the lucky recipients of the loans benefit and an excess demand for credit may be anticipated. The marginal borrower receives a subsidy of up to  $EF$ ,<sup>1</sup> where subsidy refers to the difference between the cost of credit and its value in use, for the marginal borrowers. This disequilibrium situation, at least in the simple model posited here, where there is no separation of market, reduces national income by a minimum of  $EAF$ ; since the demand curve for credit represents the discounted

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<sup>1</sup>He receives  $EF$  in that special case where the non-price rationing of credit channels it toward those clients with the highest demand price.

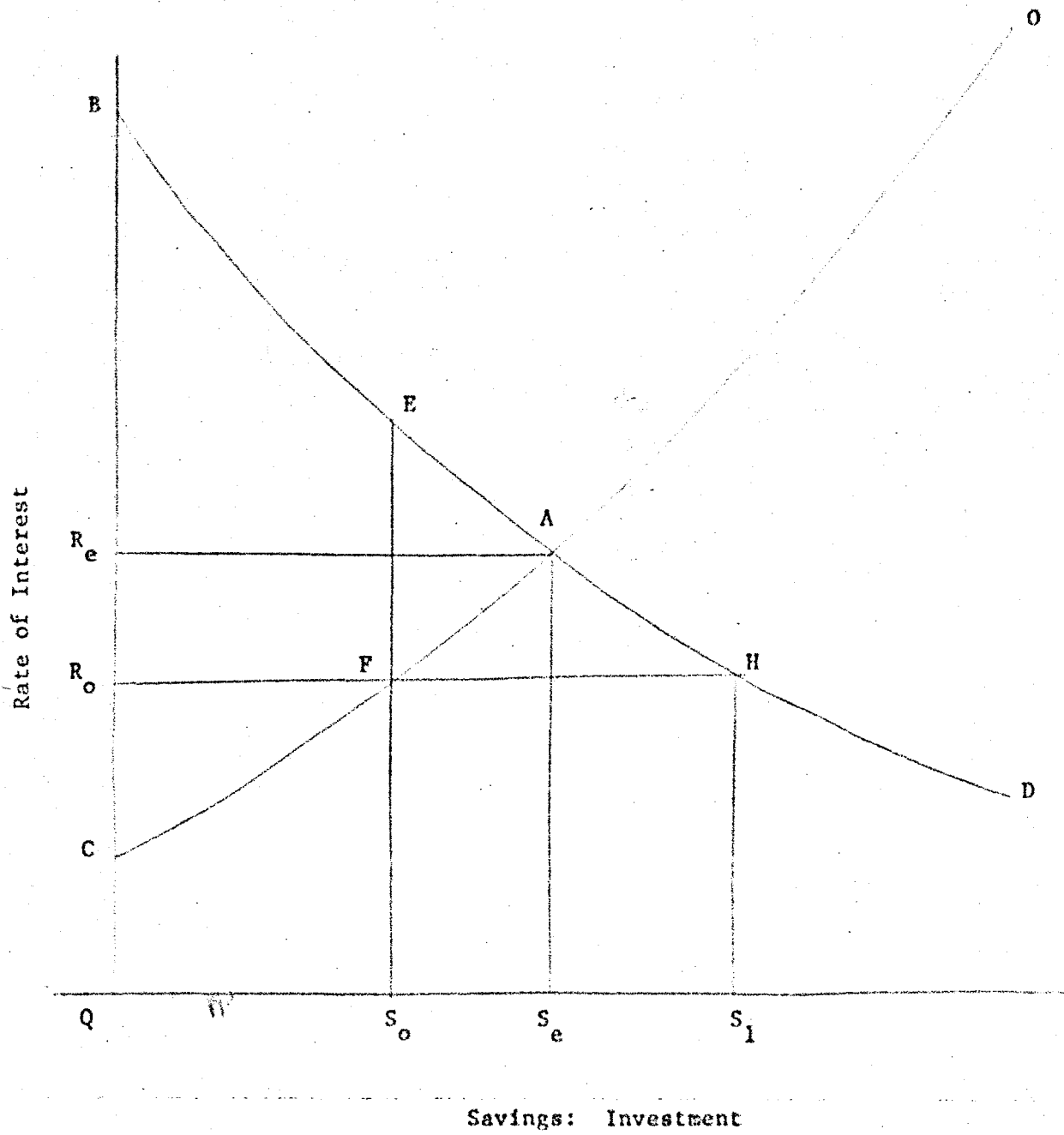


Figure 1

value of future productivity of capital for the borrower and the supply curve represents the opportunity cost to the lender, the area between these two curves and between the actual amount of savings and the equilibrium amount measures the minimum loss to the society from the existence of the below equilibrium interest rate. The loss will normally be greater than this, since the rationing procedure which replaces the price mechanism may be assumed to be less efficient and to fail to select those potential borrowers with the highest demand price as recipients of the funds. As just noted, there is in this situation an excess demand for credit (equal to FH in Figure 1); some credit hunters will have relatively low payoffs to the credit they receive, being candidates to receive it only because of the low interest rate. If, through an inefficient rationing procedure some of the lower demand price borrowers receive credit and some of the high demand price borrowers do not receive it, the total loss might be several times EAF; at the extreme, if the excess demand were equal to the total amount of savings available, (in other words,  $OS_0 = S_0S$ ) and the set of potential recipients with the lowest demand prices (all  $\geq R_0$ , of course) get the credit, then total loss due to the disequilibrium interest rate policy would be  $BEFR_0 - FAH$ .<sup>1</sup> In the absence of more complex assumptions, loss from the disequilibrium policy will lie somewhere between the minimum level EAF and the maximum level  $BEFR_0 - FAH$ , depending on the

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<sup>1</sup>The total benefit from the existence of the savings transfer market (in which funds are transferred from savers to investors) in equilibrium is  $BAR$  (the gain to borrowers) plus  $BAR'$  (the gain to savers). In the disequilibrium situation referred to in the text, the gain to savers is reduced to  $R_0FC$  and the gain to borrowers is  $EHF$  (the difference between the demand prices of the borrowers actually receiving funds and the cost of the credit to them); the difference between the gain in this case and that in the equilibrium case is seen to be the area cited in the text.

efficiency of the rationing system, where efficiency is defined by the allocation of credit to those with the highest demand price.<sup>1</sup>

The contention that a low interest rate will stimulate investment is of course erroneous when investment is limited to savings and the low interest rate is a stimulus to savings.<sup>2</sup> Any attempt to increase the demand for a low investment by low interest rates and to satisfy it by money creation will be inflationary and will not increase the real amount of investment even though it will increase investment in monetary terms.<sup>3</sup> (The acceptance of the "low interest

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<sup>1</sup>A frequent and rather well supported allegation with respect to credit systems which do not operate on a price rationing basis is that in fact firms with low demand prices receive credit, because they have good connections with the banks. If it may be assumed, as is probable, that the demand price for credit should be relatively low on the part of large capital intensive firms and higher for firms with smaller amounts of capital and presumably therefore with higher marginal productivity of capital, then the fact that the large firms usually have good connections and can achieve credit at will is highly consistent with this proposition, both in terms of the productivity with which credit may be used and in terms of its income distribution impact.

<sup>2</sup>The argument presented here is based on the assumption that the supply curve of savings is positively sloped; savings theorists are not fully agreed on this issue, some arguing that there is little relation between the two variables; if the savings curve were vertical then the only loss to the society as a whole from the disequilibrium interest rate policy would be the probable inefficiency of the rationing system to replace the market.

If the offer curve of savings were backward bending, the use of a below equilibrium interest rate would foster savings, and unless the loss from inefficiency of the rationing procedure were great, the net effect on the growth rate could be positive. Even in this case, though, welfare theory indicates that the non-equilibrium rate lowers welfare; i.e. a too high level of savings can lower welfare when the opportunity cost is high enough. Here the question of whether individuals' preferences can be construed as the sole determinant of the optimal savings rate becomes particularly crucial, although that issue arises in the other cases as well.

<sup>3</sup>Abstracting from the unlikely possibility that the developing country finds itself in a generalized Keynesian situation.

rate argument" seems to be in part a result of the fallacy of composition, where by the fact that to the individual borrower a low interest rate is attractive, leads to the conclusion that it is beneficial as a whole ). Since the above analysis is oversimplified (especially given the assumption of a single credit market through which all savings flow and on which all investment is based) the results flowing from it cannot be imbued with much confidence; in the next section the model is complicated by allowing for different types of and uses for savings.

#### Alternative Uses of Savings (from the savers point of view)

A saver can choose among several alternative ways of disposing of his funds; for present purposes it is useful to distinguish four categories: direct use of the savings (by himself) in some investment project; lending them in the financial markets, i.e., savings deposits, purchases of bonds, purchases of stocks, etc.; holding them in the form of cash; and investment in non-reproduceable and/or unproductive physical assets.<sup>1</sup>

To ascertain the implications of a non-equilibrium interest rate it is necessary to analyze in some detail how allocation among these forms of savings is related to the interest rate, as well as understanding how total savings depend on that rate.<sup>2</sup>

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<sup>1</sup>As explained below, this category refers to that whole group of assets an increased demand for which does not lead to an increase in the total productive capital stock, either because supply is perfectly inelastic (e.g., land) or the capital good will not be used immediately (e.g., an asset held for speculative reasons).

<sup>2</sup>A full understanding of the choice of assets requires consideration of the attributes or characteristics of such assets which are important to the saver. Yield, risk, and liquidity are usually assumed to be the big ones. How these attributes vary among the four asset groups distinguished above, and how such



(Footnote 2 continued from page 5)

differences depend on such conditions as the rate of price change will underlie. much of the discussion to follow.

The relevance of the distinction by savings channels depends on their being related to four possible effects of savings: the effects of interest are (a) increased demand for productive capital by the saver, resulting in an increased supply of that capital, (b) increased demand for productive capital by someone else (to whom the funds have been transferred), resulting in an increased supply of that capital, (c) increased demand for assets where the increased demand does not lead to an increased supply of any capital good--either because the demand is for a non-reproducible capital good (like land) or because it is for a consumer good (e.g., consumer durables) the stimulation of whose output--even if it occurs--does not increase the total productive capacity of the economic system, (d) increased demand for money balances. Our four savings channels are designed to correspond to these four effects, though inevitably the relation is not complete. Thus, if the supply elasticity of a certain producible capital good is zero (in the relevant price range) the effect on total capital stock of an increase in demand for it is zero; the effect is the same as if the good were not producible. Or it may be that transferred savings are invested in ways which do not increase the capital stock.

Note that savings which leads to increased production of a capital good which is in excess supply and underutilized (as often argued in the case of luxury housing) really corresponds to category (c) above. Also falling in this category is the purchase in advance of use (or in advance of the time of purchase had the capital market functioned better) of consumer durables; until consumed, their holding as inventory constitutes the holding of unutilized capital.

It is clear that the initial or partial impact of the use of savings will not generally be the same as its general equilibrium effect, the latter naturally being much harder to evaluate. The discussion here is based essentially on the assumption that the general equilibrium effects of different uses differ in the same direction (though obviously not necessarily in the same degree) as the partial or direct effects. While such an assumption certainly seems more appropriate than its opposite, it implies that the analysis is only a first step, and would have to be substantially complicated before firm conclusions could be drawn.

A further real world complication is that the various effects distinguished here come in all degrees, e.g., the effect of an increase in demand for a given capital good on its output is not necessarily either zero or equal to the demand; it is usually between these two extremes. In this respect, too, our discussion oversimplifies and makes distinctions in kind which in the real world are much more likely to be differences in degree. Note that monetary savings are usually presumed to lead to an amount of investment equal to the savings, but this is in fact a matter requiring analysis.

The conditions which give each savings channel its yield, risk, and liquidity characteristics are clearly big elements in any discussion such as the present one.

In Figure 2, plausible relationships between these various forms of savings and the interest rate are traced out. The implicit assumption is that total savings are a positive function of the rate of interest as indicated by the curve  $S_t S_t^1$ . Note that the rate of interest measured on the vertical axis is that corresponding to transferred savings; the rate of return is not generally the same for all forms and it remains to consider what relationship, if any, exists among the rates corresponding to the different assets. To the extent that the real rate of interest on money balances (zero when there is no inflation or deflation) is a function of the rate of interest in the transferred savings market,<sup>1</sup> the analysis presented here is too simple; some complications are considered below.

Holding constant (e.g., at the level zero) the real rate of interest on money balances, it may be assumed that those balances will be a negative function of the (real) rate of interest on transferred savings, as suggested by the curve  $S_m S_m^1$ . A similar monotonically negative relationship may be expected to hold with respect to own investments of savings (shown by the curve  $S_o S_o^1$ ) though here it must be assumed that the rate of return on such investments is a (positive) function of the rate of interest on transferred savings.<sup>2</sup> The relative position of curves like  $S_o S_o^1$  and  $S_m S_m^1$  would of course vary with the individual or entity, but is not considered further here, since we are interested essentially in their relative relationships with the rate of interest

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<sup>1</sup> i.e., to the extent that events in the savings markets help to determine the rate of inflation.

<sup>2</sup> Assuming that each saver has a diminishing rate of return to capital in own investment, a lowered  $r$  on transferred savings--leading him to effect more own investment--will lower that rate of return as well. The precise relationship between the two rates would depend on the individual's preference system, among other things, and need not concern us here.

Market Equilibrium Savings Curves, By Use of Savings

Real Rate of Interest on Transferred Savings

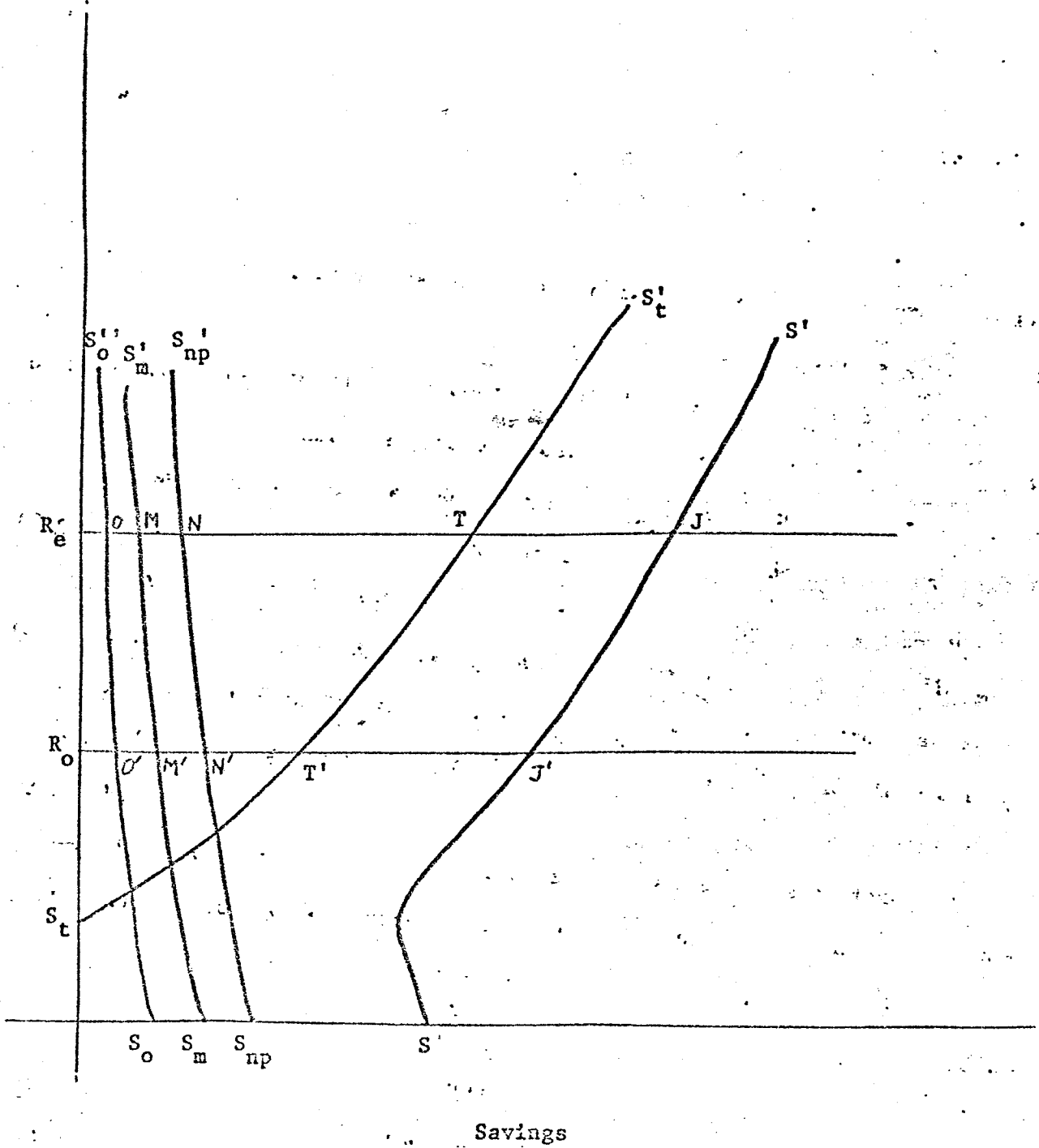


Figure 2

on transferred savings. Another savings use mentioned--application to the purchase of non-reproducible or non-productive assets (which, as the term indicates, may or may not be used in the production process),<sup>1</sup> bears a less obvious relation

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<sup>1</sup>It is useful, at this point, to distinguish between the market equilibrium savings curves for the population as a whole (as shown in Fig. 2) and the curves of a representative individual who, at a point of time, takes as constant all those variables exogenous to him except the  $t$ - $s$  rate of interest. Figure 3 could represent the preferences of such an individual. If the equilibrium rate of interest is taken as base, (i.e., if the individual assumes that, as the  $t$ - $s$  interest rate is manipulated, all other variables exogenous to him will remain constant at the level corresponding to the situation where  $R = R_e$ ) the representative individual and the economy would have the same percentage distributions of savings at that equilibrium rate, but not at other interest rates, since the individual is assumed not to take into account the changes in other variables which result indirectly from the change in the  $t$ - $s$  interest rate; i.e., when the interest rate is  $R_e$ , the representative saver distributes his savings in the proportions indicated in Figure 2 ( $R_e M$  in the form of monetary savings,  $R_e O$  in the form of own investment,  $R_e N$  in the  $n$ - $p$  assets, and  $R_e T$  in transferred savings, to give a total of  $R_e J$ ). Comparing Figure 3 curves to those of Figure 2, indicates how the change of other variables accompanying the decrease in the interest rate from  $R_e$  to  $R_o$  leads to different savings patterns from those which would be extrapolated by the summation of individual expectations when the interest rate was still  $R_e$ . (The individual's savings distribution at the interest rate  $R_o$  is composed of  $R_o O'$  of his own savings,  $R_o N'$  of  $n$ - $p$  asset purchases,  $R_o M'$  in the monetary form, and  $R_o T'$  in transferred savings to give a total of  $R_o Q$ . What the individual does not predict correctly in forming his ex ante plans on savings composition at  $R_o$  is the rise in price of  $n$ - $p$  assets, or, what is the same thing, the fall in  $R_{np}$  associated with the fall in  $R$  (it is also possible that the return on his own investment is related to the amount of such investment carried out by others and/or the amount of investment based on savings transfers. The "expected" relationship in each case is presumably negative, though there would be many exceptions). It would be extreme to assume that no fall in  $R_{np}$  would be expected by the individual, but it seems likely that he will underestimate the full extent of this general equilibrium effect. Such an underestimate would imply that his ex ante  $n$ - $p$  savings would be above the level actually resulting when  $R$  falls, i.e.,  $R_o N' \text{ of Fig. 3} > R_o N' \text{ of Fig. 2}$ . If his total savings at  $R_o$  were correctly predicted by the individual when  $R=R_e$ , then one or more of the other three savings forms would have to be underestimated by him--very possibly all would be. Whether he will over or underestimate his savings at  $R_o$  depends on which of the price effect (one form of investment yields less ex post than he predicted) the wealth illusion effect (his  $n$ - $p$  assets rise in price more than he expected) and the liquidity effect (his liquidity rises more than he predicted) predominate. In Fig. 3 we assume no error in prediction of total savings. A representative individual's curves could be drawn based on each other possible  $t$ - $s$  interest rate (i.e., assuming the values of all other variables in the system at the levels corresponding to each other  $t$ - $s$  interest rate). The curves of Fig. 2 are, in effect, the loci of the positions of each curve at the  $R$  used as base for drawing the curves in a given figure; i.e., the Fig. 2 levels of each form of savings at  $R_i$  correspond to the ex ante levels shown by the curves corresponding to the existence of  $R_i$  and the associated levels of the other variables endogenous to the system.

Ex Ante Savings Curves of the Representative Individual When  $R = R_e$

Real Rate of Interest on Transferred Savings

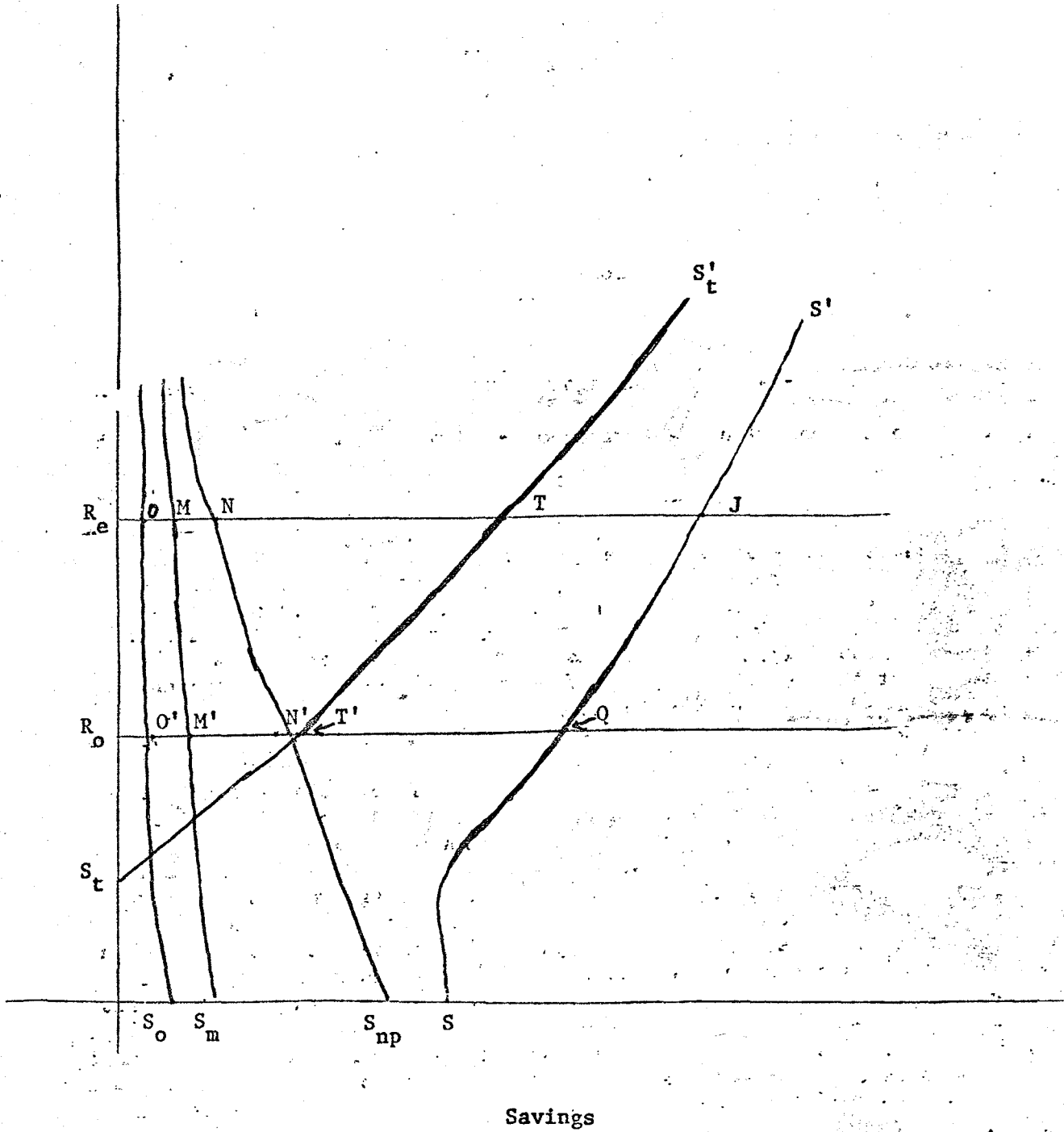


Figure 3

to the interest rate even in the absence of any relationship between the rate of inflation and the rate of interest on transferred savings. There is, however, much reason to expect a relationship between the rate of interest on these goods and the rate on transferred savings (or other uses) especially in the case of non-reproducible assets like land, but also for real estate and some other assets. Factors helping to determine this relationship are the differences between transferred-saving assets and  $n-p$ <sup>1</sup> assets in characteristics other than capital (i.e., risk and liquidity) and the mobility of investors between the two types of assets. In a world without risk or illiquidity or inflation, and with perfectly mobile investors (as between assets) the rate of return on  $n-p$  assets would be the same as on transferred-savings assets. The price of the former would change in such a way as to make the rental/price ratio correspond to the (general) interest rate; thus a rise in  $r$  would lead to a lowering of price. Such asset price changes might or might not have wealth or liquidity effects on the overall savings--interest rate relation--see the discussion below. If, for whatever reason (e.g., lack of familiarity) investors are somewhat immobile between assets, the rate of return on  $n-p$  assets will be a positive function of but will not move by the same amount as the  $t-s$ <sup>2</sup> interest rate. Finally, the more the attractiveness of  $n-p$  assets to the marginal buyers lies in features different from yield (like low risk or high liquidity), the less will the rate of return in this market be tied to that of the  $t-s$  market.<sup>3</sup> Whatever the precise

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<sup>1</sup>This symbol will henceforth be used to refer to non-reproducible and/or non currently productive assets.

<sup>2</sup>Transferred savings.

<sup>3</sup>We abstract here from the multitudinous second-order effects which come into play in the real world, e.g., the risk attached to the holding of  $n-p$  assets is in turn a function of the extent to which that market is tied to the  $t-s$  market.

values of these various relevant coefficients, the normal relation between an individual's ex ante investment in the n-p market and the t-s interest rate will be negative; the two interest rates will tend to move in the same direction. Since the supply of n-p goods is fixed (or nearly so) the change in demand for them leads to changes in their price. This means that the negative relationship between ex ante savings channelled to the n-p market and the rate of interest on transferred savings does not show up in the market equilibrium curve corresponding to this market; by definition that curve coincides with the vertical axis, unless in fact the production of some goods falling in this category does have positive elasticity. In that instance the market equilibrium curve will have negative slope.<sup>1</sup>

The transferred savings curve, indicated by  $S_t S_t^1$  shows the positive relationship which that variable is expected to bear to the real rate of interest. Note that even if total savings are not a positive function of the interest rate on transferred savings, transferred savings are almost certain to be, unless the overall relationship is quite negative. The price effect of a higher  $r$  should have a positive effect on the share of total savings which are transferred. Two other effects are likely to be at work. The conventional income effect, whereby the greater ease of achieving a given future consumption level is expected to lead--other things being equal--to an increase in present consumption

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<sup>1</sup>As indicated above, durable consumer goods which the individual plans to use himself later will fall into this category, and the demand for them will be a decreasing function of the interest rate on transferred savings; demand for durable consumer goods which the individual does not plan to use himself must be speculative in some sense of the term, although he need not be expecting an increase in the real value of the assets, if the real rate of interest on money is, for example, negative then the individual would be expected to speculate on certain forms of final consumer goods or other goods as long as their rate of return were expected to be less negative than that of money itself.

(decrease in savings); in other words it works against the price effect. A second effect referred to above works through the price of non-reproducible or slowly reproducible capital goods and may better be termed a combination liquidity-income effect. In the absence of significant wealth illusion its effect will be in the same direction as the price effect. Consider a non-reproducible asset like land. An increase in  $r$  would lead to a decrease in the demand for land (a now relatively less attractive asset) and as a result a decrease in its price. (The price decrease gives sufficient incentive to buyers so that there is a holder for every unit of these assets.) One effect of the price decrease is to lead to a decrease in wealth; although the real productive capacity of the system stays the same its value in terms of power to purchase current consumer goods decreases. This would appear to constitute a factor tending to increase the total savings rate. If, however, the asset holders consider not the consumer goods purchaseable now with their assets but those purchaseable in the future, nothing has changed. In the absence of a "wealth illusion" whereby the individual does believe his wealth level has fallen, no change might occur. One effect, however, is a decrease in his liquidity (relevant in the event, for example, that contrary to his basic plan he should have to realize some of these assets before he planned) and this could lead to a justifiable increase in savings to offset that liquidity reduction. In short, it appears that the only plausible effect which might work against a positive savings--interest rate return would be the conventional income effect.

To summarize this section: as a first step in the (necessarily more complicated) analysis of the impact of manipulations of the transferred savings interest rate, we have assumed that such manipulations do not lead either directly



or indirectly to changes in the rate of inflation and we have ignored most second order effects. Such interactions do not create any conceptual problems, since the curves presented in Figure 2 can be thought of as the market equilibrium paths of the variables in question (in response to a change in the  $t$ -s interest rate) for any degree of complexity in the economic system. Figure 2 should be interpreted as taking into account those general equilibrium impacts which have been included in the discussion. As we see below, the curves could have quite different shapes in economic systems with different characteristics, e.g., if the rate of interest acts through other variables, like inflation, back on the variables discussed here. In the discussion presented above, the only indirect impact considered on savings was that of the increase of private wealth due to the increased tendency to invest in non-reproducible assets, and since this would normally be expected if anything to decrease total savings, it would simply accentuate the positive slope of the  $S_t S_t^1$  curve and would not change the qualitative nature of the argument.

#### The Influence of Inflation and Its Interaction with the Variables Considered

It seems probable that in most economic systems the inflation rate is associated with voluntary savings via a process whereby the government feels obliged to undertake a certain amount of spending on infrastructure and other services, and possibly also to allocate a minimum amount of credit to the private sector, somewhat independently of the level of the voluntary savings.<sup>1</sup> When this is the case, the rate of inflation and the level of savings are likely to be

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<sup>1</sup>Put more generally, if voluntary savings are low, the government is likely, among the feasible policy packages available to it, to prefer one which involves inflation.

inversely related; such a condition means that the assumption (used in the above discussion) that inflation is not an endogenous variable to the system is incorrect. The analysis may also differ somewhat if a rate of price change not equal to zero is assumed, even though it is not related causally to the other variables considered. This case is discussed first, since it is simpler than that involving interaction of inflation and the other variables.

Conceptually it is possible (though in the real world not very probable) that the presence of inflation will not affect those real variables which determine the rate of return on own investment or on transferred savings; if this were the case, then these two curves might not be expected to shift as between a non-inflationary situation and an inflationary one, provided that either the other two curves did not shift, or that there were no causal links between the two pairs of curves. It seems clear, however, that each form of savings is a substitute in some degree for each of the others; since the curve  $S_m^1$  would shift to the left, by a greater amount the higher the level of inflation it may be anticipated that the transferred savings and own-investment curves will shift to the right, relative to those of Figure 2. The effect on the  $S_{np}^1$  curve is less predictable; it seems probable, however, that this curve will also shift to the right,<sup>1</sup> since n-p assets may be rather close substitutes for money balances for many people, i.e., the lower rate of return on liquidity is likely to lead to an increasing tendency--other things being equal--to invest in non-productive assets; this will generate a greater upward trend in their prices

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<sup>1</sup>As observed in the preceding section, for this curve not to coincide with the vertical axis, there must be some producible goods (with positive supply elasticity in the relevant price range) included in the n-p category. We are assuming that in this discussion.

than would otherwise occur, or more precisely, a higher real price series over time for these assets than would have evolved in the non-inflationary situation<sup>1</sup> for the non-reproducible items in the bundle, and a greater supply of the producible ones. If it is true that total savings is a positive function, other things being equal, of the attractiveness of each form of savings, then total savings will be less under inflationary circumstances.

Analysis of the overall impact of inflation of course must take into account the distribution of the additional spending which caused it in the first place.<sup>2</sup> If that spending was oriented more towards investment than was the reduction in real purchases by persons so affected, then the total impact on investment and savings could be positive. In the extreme case where inflation resulting from government investment did not decrease the savings of the private sector at all, it would be almost a foregone conclusion that total savings and investments would rise as a result of it. Or in a case where all the additional spending was on consumption, the impact would almost certainly be negative; only if the wealth effect on savings was very strongly positive could this result be avoided.

#### Inflation as an Endogenous Variable

In the preceding section, it was assumed that the rate of inflation was an exogenous variable, and although it affected the relative attractiveness of various forms of savings, it was not causally related to interest rate policy. In fact, both a low voluntary savings rate (which is likely to result from a below equilibrium interest rate) and the high demand created by a below equilibrium

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<sup>1</sup>An additional factor likely to be at work in situations where the rate of inflation fluctuates, and in so doing creates greater relative price uncertainty for some products than for others--and greater fluctuations in the real value.

<sup>2</sup>Assuming the inflation is basically of the demand pull type.

rate, are likely to put inflationary pressures on the system.<sup>1</sup> With the rate of inflation a negative function of the interest rate, the market equilibrium curves of the savings variables considered here are altered. Assume that with the equilibrium interest rate  $R_e$  inflationary pressures are just under control, but with any lower interest rate, inflation would result.

The effect of this complication is to make market equilibrium curve analysis more difficult; in some cases it appears to make the curves more elastic to the interest rate than otherwise, but others it throws even their slopes into question. Consider the savings in money balances curve; in the absence of inflation it had a clearly negative slope, but if the rate of inflation is a decreasing function of the t-s interest rate, the inflation corresponding to a low interest rate would tend to discourage the holding of money balances so the slope of this curve is undefined--it could be negative or positive.<sup>2</sup> In the case the own investment, curve which in the absence of inflation bears a negative relationship to the interest rate, that relationship should be stronger under inflation,<sup>3</sup> since the holding of money balances is less attractive than in the previous case. The slope of the n-p savings curve will probably also be lower than before, i.e., its elasticity to the interest rate will be greater than before, partly because money balances are less attractive, and partly because of the greater relative

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<sup>1</sup> In turn the presence of inflation is difficult to reverse because it makes high real interest rates difficult to alter due to institutional restrictions weighing against high nominal rates.

<sup>2</sup> Under inflation, the nominal t-s interest rate is, of course, above the real one. Choosing a real t-s interest rate is a less straightforward maneuver, since policy normally acts directly on the nominal rate. But under normal assumptions with respect to the financing of the economy, there will be a monotonic relationship between the two rates so that with full knowledge of that relation it remains possible to set the real rate at the desired level.

<sup>3</sup> Even if the rate of interest on transferred savings does not contain a higher risk component than before (due to variations in the rate of inflation) it may well be assumed to have.

price uncertainty frequently built into inflationary situations. If this is so, a decrease in the real interest rate which causes inflation will lead to a greater increase in real wealth associated with n-p assets than would a non-inflationary decrease in the interest rate, hence the negative impact of the low t-s interest rate on total savings will be greater than in the other cases considered.<sup>1</sup>

### Summary and Further Considerations

The above analysis has focussed on three ways in which the transferred savings interest rate is related to savings behavior and the contribution of savings to welfare, with a view to ascertaining in particular whether a below equilibrium rate is likely to constitute a wise policy. Aspects considered were (a) the efficiency of allocation of transferred savings according to whether price rationing or some other form of rationing is used (b) the way in which the allocation of savings among forms (transferred, invested by the saver, put in money balances or purchase of non-reproducible assets and/or non-productive assets) is related to the transferred-savings interest rate and the impact of this allocation on total savings, the efficiency of resource utilization and (c) the overall impact on total savings. Theory provides no answer as to whether, in a country with substantial capital market and other imperfections, the optimal rate of interest is the equilibrium one, (or ones, given the existence

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<sup>1</sup> i.e., the short run impact of the low interest rate on savings via the wealth effect should be particularly negative, whether the long run impact is less severe is unclear; possibly failure of real wealth to rise as fast it otherwise would have created an incentive for higher savings. But though the long run impact may be mitigated by this factor it could not reverse the overall result. And if "vicious circle" type phenomena come into play over time, the short run impact could be accentuated over time.

somewhat separated markets) but it does provide interesting guidelines on the mechanisms by which higher or lower interest rates may affect the situation. Theory suggests that below equilibrium interest rates run a high risk of (a) lowering total savings, (b) worsening the allocation of transferred savings among borrowers, and (c) promoting inflation which in itself is likely to discourage savers and further lower the savings rate.<sup>1</sup>

Even if it were possible to ascertain the coefficients introduced into the above analysis and which are necessary components of an answer to the interest rate question--some important unknowns would remain to be considered, in particular the relative social efficiency of savings used in the various ways cited. If a saver had the alternative of investing his own funds or transferring them through the system, but a peso of transferred savings did not lead to a peso of investment, then the net effect on savings (investment) of the transfer would be negative. The coefficients of "net additional investment to additional transferred savings" may be greater than one or less than one; this factor must be borne very much in mind in the analysis of the relative efficiency of the two forms. Both the saver's and the potential borrower's own investment curves

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<sup>1</sup>One perhaps extreme framework within which the savings-interest rate--inflation nexus could be viewed would include a public sector with inflexible goals on public investment--which are satisfied by money creation regardless of the level of inflation--the impact on private sector saving and investment might then be deduced and the relation between the original nominal interest rate and the resulting real interest and total savings levels traced out. One argument mentioned above was that the impact of a below equilibrium savings rate would be to increase pressures on the public entities to disperse more credit than otherwise; this might suggest a tendency for total investment to rise (assuming the credit is sought primarily for investment purposes). If the negative wealth effects of the inflation fell especially on people with high wealth elasticities to consume, this could easily occur. It might even be that a low government capacity to save would promote investment, if via an initial negative impact on the real interest rate (through government borrowing from the central bank) it raised the demand for private investment credit and satisfied that demand via further money creation which cut into private consumption.

In short, while the general case may have inflation lowering the savings rate, this cannot be taken for granted.

are involved; whether total investment rises when a dollar is transferred depends on the relationship between transferred savings and own savings for the transferer and for the borrower, as well as the relative efficiency of use of savings by the two. Innumerable empirical situations can be conceived. Some further generalizations can be made, however. Probably the easiest of the relationships to analyze in this context is that between transferred and own invested savings. In a riskless world with no transfer costs, the individual would equate the rate of return on his own investment ( $R_o$ ) and the rate of return on transferred savings investment ( $R_t$ ). In the real world the rate of return he himself would receive on transferred savings ( $R_{ti}$ ) would be equal to the gross social rate of return on that investment ( $R_{ts}$ ) minus (a) the real cost of transfer ( $R_{ct}$ ), (b) any above normal profits involved in the intermediation process ( $R_{\pi t}$ ) and (c) the differential earned by the borrower as a result of being able to borrow the funds ( $R_{bt}$ ); (we assume in other words that typical borrower is not the marginal borrower, whose demand price interest rate is equal to the supply price interest rate).<sup>1</sup> Assuming pure competition in the intermediation service it pays, both from an individual and a social point of view, to distribute savings so as to push the rate of return on own investment down farther than that on transferred savings due to the unavoidable real cost of the transfer; if there are monopoly profits in the intermediation process, however, too many funds tend to go into own investment, relative to the social optimum. In a world with risk, direct utility or disutility from certain ways of doing things, etc., a number of other such factors must be taken into account. Some individuals probably have a preference to control their own investment even at a lower interest rate than what they could receive in transferred savings; others have the opposite preference. In terms

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<sup>1</sup>For the marginal borrower, this last term drops out,  $R_{ts}$  being also below the average  $R_{ts}$  on all funds passing through the market. In terms of efficiency of resource allocation, it is the marginal borrower who matters, of course.

of overall welfare maximization it is appropriate that these preferences be an input into the determination of the distribution of funds between the two uses, so there is no reason to expect inefficiency to result from them.

The risk problem is something different. It is frequently the case that risk is less on transferred savings, since the ultimate combination of investments which they support is more varied and balanced than that which an individual would have; for this reason he may tend to transfer to a point where the average rate of return to him on transferred savings is below that on his own investment; given the lack of a perfect market to insure him against fluctuations in the rate of return on his own investment, this is presumably optimal since his own welfare is directly lowered if he has to bear too high a risk level. A second form of risk, however, may create inefficiencies. The saver who in transferring his savings runs a risk of being deceived in some way or other by the recipient of the funds optimal may be expected to decrease his savings transfer below its otherwise optimal level; this will tend to lower total national income as traditionally measured, i.e., assuming the same marginal utility of income for each person; If certain interpersonal comparisons (for example, assuming that the deceivers should be assigned a lower marginal utility of income than the honest people) are made, this result would not necessarily hold. It is possible, of course, that some individuals will have to little risk aversion of this sort, for their own good, and this could also decrease total income by encouraging entrepreneurs to enter the deception industry.

The impact of the below equilibrium interest rate on transfer savings is, as noted above, likely to lead to some redistribution towards own investment of savings and away from transfer. If the marginal social productivity of the two



uses was equal before, or would be equal under an equilibrium interest rate, it will now, of course, be unequal and the overall efficiency of use of the savings will have decreased. If the marginal social productivity of transferred savings was below that of own investment savings before, however, the opposite will be the case, and the restriction on the transfer will lead to an increase in efficiency of resource utilization; if the opposite relation would hold with an equilibrium interest rate, the loss will be increased by the new factor. Empirically speaking, most observers would probably argue that the marginal productivity is higher on transferred savings than on own-used savings, due to lack of familiarity with the capital markets, the fact that a demand for investment funds usually reflects a good project with substantial payoff, the fact that funds are frequently transferred from individuals with very few, if any, investment opportunities, and so on. The relevant comparison is linked to the marginal savers, however, and it remains an empirical question whether this is true or not for them; it seems likely that those with very few alternatives for their own savings will in fact be intramarginal transferers, i.e., they will transfer even at a well below equilibrium interest rate; those whose transfer will or will not occur, according to whether the interest rate is at equilibrium or at some point below it, may have fairly good opportunities for own investment.

In fact it would appear that efficiency is very much a function of the particular capital market in a given economy; some markets take funds from certain types of borrowers and pass them to certain types of borrowers and other markets involve different people on each side of the flow. It seems probable for some less developed countries that those markets which channel funds to large already capital intensive firms with generally good access to funds may not be leading to any

increase in national income. In any case, the whole question is an empirical one calling for a good deal of detailed study and disaggregation of the capital market system.

The social productivity of savings which are held in money balances must be appraised indirectly, and may depend substantially on the way in which the monetary-fiscal system works, on the flexibility of prices in a downward direction, and on a number of other factors.

The simplest situation in which to analyze this problem is one where either prices are flexible downwards so that a decrease in aggregate demand does not lead to any non-utilization of resources, or where the government's counter-cyclical monetary and fiscal policies reinject into the circular flow any funds removed permanently via savings in these forms. Under these conditions has the opportunity to determine the use of the resources freed by the saving in question [either the government or the monetary system (or both if the two systems are well coordinated)] so the use would be final either in government expenditures or credit from the backing system to the private sector which was deemed to provide a higher payoff. In either case, this is the most efficient form of transfer in the broad sense of the term, since there is less intermediation cost in getting the funds from the saver to the investor than in the typical case; for example, if the monetary system expands to make up for the savings the costs are only those of allocating funds to the investors, not of managing savings accounts, and so on. In the case of the government the costs are almost certainly much less, since the alternative is taxes and the collection cost of taxes plus possible disincentive costs may well be substantial.<sup>1</sup>

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<sup>1</sup>It is true, of course that in a system which does not have mechanisms

The conclusion that hoarding may be the most efficient form of savings from a social point of view creates a complexity in the discussion of the optimum rate of interest on transferred savings. Assuming that an artificial decrease in that rate (i.e., to a below equilibrium rate) will imply an increase both in own investment and in hoarding (we abstract for the moment from the fourth possible use--the purchase of "n-p assets," it may well be the case that the substitution of own investment for transferred savings implies a decrease in the efficiency of resource utilization and the substitution of hoarding for transferred savings implies an increase. Finally, of course, there is the effect on total savings, generally assumed to be negative. In such a case there would be two substitutions tending to worsen the allocation of resources (including one between savings and consumption) and a third tending to improve it; whether the net impact is positive or negative becomes an empirical question.<sup>1</sup> The effects of the below equilibrium interest rate could vary in different subsectors of the capital market, and for different ranges of the transferred savings interest rates. The possibility that a below equilibrium rate would bring gains depends considerably, it should be pointed out, on there not being any inflation so that the rate of return on liquidity is at least not heavily negative. If it is, it seems unlikely that many people will turn to liquid assets when the t-s interest rate falls.

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Footnote 1 continued from page 23.

available to assure the full utilization of resources, savings in the form of hoarding may be the worst thing that can happen, since it involves a decrease in aggregate demand on the part of one person with no compensating increase on anyone else's part; this is, of course, the Keynesian problem. But it is another irony of economics that what is the worst possible phenomenon in the Keynesian world may be the best possible phenomenon in a neoclassical or non-Keynesian world.

One could also argue, perhaps, that this transfer mechanism is not as efficient as it appears in that it may lead to instability in the system with a high level of liquidity, but these problems are at a different level of discussion from the ones we consider here.

<sup>1</sup>A further factor considered above, of course, is the presumed greater inefficiency of distribution of transferred savings when the interest rate is below equilibrium.

Another question frequently raised is the impact of the interest rate on employment and income distribution. It is frequently argued that low interest rates favor highly capital intensive enterprises, and thereby restrain the demand for labor, and create unemployment. At one level of analysis the impact of a below equilibrium interest rate on the demand for and price of labor is fairly straightforward; given perfect markets for labor and assuming that in spite of the below equilibrium price of capital all firms tend to have the same relative marginal productivities of labor and capital, the below equilibrium interest rate may be expected to lower the demand curve for labor and decrease the equilibrium wage rate via the discouragement of savings and decreased total investment; in a system where the labor market is imperfect it might, instead, create unemployment. Such an analysis, however, is not very instructive, since it is almost a foregone conclusion that in the presence of a subsidy to the use of capital to certain borrowers, other borrowers will not receive the subsidy, the relative marginal productivities of labor and capital will not be the same for all firms, and there will be not only an impact on the overall capital labor ratio, but also an impact on the distribution of labor across firms; this complicates the effect on employment and/or the wage rate. Whether in fact the low interest rate tends to generate high capital intensity is a complicated matter whose analysis requires some consideration at least of the dynamics of firms of different types in an economy with this imperfection in the capital market. Few generalizations seem warranted.