CHAPTER IV.

THE RATE OF INTEREST

§ 1

The Choices of a Crusoe

Before considering in detail the working out of the forces determining interest in modern society, let us ask how these various forces would act upon an islanded Crusoe. The Crusoe of the story begins his isolation, not absolutely without capital, since something is saved from the wrecked ship, but with comparatively little capital. As he has leisure from the activities necessary for present support of life, he devotes himself to making equipment for his continued existence on the island. He builds himself a house, cuts a boat out of a log, makes himself bow and arrows, accumulates a herd of goats, and in other ways prepares himself against the contingencies of the future. To do this, he has, of necessity, either to lay aside a store of food for use while producing equipment or to devote a part of his time each day or week, while producing the equipment, to the production of necessary food. In either case he may be said to use part of his labor for purposes other than the satisfaction of his immediate wants, to practice abstinence in not immediately consuming all that his labor produces, to save or accumulate the results of a part of his labor against the possibilities of future use. And in either case this saving takes, eventually, the form of buildings, tools, flocks and herds, orchards, etc.

In accumulating these various kinds of equipment, Crusoe uses a roundabout rather than a direct method of satisfying his later needs. He might get along by consuming such sea food as he could find, in various depressions and crannies, after the outflow of the tides. He chooses rather to deny himself some immediate satisfactions in order to make a net and fishing lines. He might plan to use the net and lines from the shore or by wading out in the water. Instead he prefers to sacrifice, in part, the early income thus securable, and to devote some of his time to building a boat. He might hunt all over the island for a goat to kill, whenever he was hungry for meat. He chooses, however, to make the sacrifice, early in his islanded life, either of consuming less meat or of spending more time in goat capture, so that, later, a minimum of labor may provide him with a maximum of meat. For a like reason he builds fences to keep his captured goats from escaping.

In all this turning of labor to remote ends there is presumably some gain. But we may fairly assume the most important, the most advantageous capital to be constructed first. It is important to have a net, less important but still worth while to have a boat. Likewise, progressive improvements in the quality of the tools and buildings required, have progressively less and less importance. Crusoe must, therefore, decide at what point he no longer cares to make present sacrifices for the larger but larger-to-a-decreasing-degree, future gains. At the beginning, having little accumulated capital to work with, Crusoe has to devote much of his time to supplying present

necessaries. He can devote little time to producing equipment, just because he has but little equipment to work with. For the same reason the time he is able to devote to producing equipment does not provide him with any large amount of it. But roundabout production is of the greater relative advantage to him so far as he can carry it on, just because he can afford to resort to it so little; and this large per cent gain may tempt him to forego present consumption almost as far as he possibly can do so. He practices abstinence, abstaining, so far as he can, from present consumption, for the sake of the gains to be realized by so doing. When he begins to realize these gains, to enjoy the larger production which his equipment makes possible, or to produce the old necessities in less time, he will be able to spare more time for the further elaboration of tools; but the per cent gain from so doing will be reduced. With his already accumulated tools, Crusoe's labor directed to providing immediate satisfactions is now much more effective than formerly. More or better tools might result in further gain but the gain becomes progressively smaller.[1]

But in all this, though we have influences of the kind which bear upon the rate of interest, we do not have a problem of interest such as exists in modern society. A Crusoe may, indeed, compare

[1] Probably the rational thing for Crusoe to do, if he expected no one to follow him, would be to wear out gradually, as life drew to a close, the accumulated equipment of early years; but if he could hope to be succeeded by descendants, or others in whose welfare he would feel deeply concerned, there would be reason in his keeping up his equipment to the last.

present goods and future. He may determine that his home is the equivalent of a certain amount of food. He may give up certain enjoyments to secure it, thus showing that he regards it as preferable to those enjoyments. In a sense he values it in terms of the kind of enjoyments sacrificed. But there is lacking an alternative which exists in organized society as we know it and which has considerable significance, the alternative, that is, of devoting himself to producing either present or future goods and securing the other type of goods by exchange. He may produce the one type of goods or the other, and he may determine how much of the one type he will have and how much of the other and when it no longer seems worth while to devote an extra hour to the one purpose to the exclusion of the other purpose. But he cannot take advantage of his own specialized skill and that of another, to devote himself to one line of production and trade the results for the products of another line. There is not open to him, isolated as he is, the opportunity to make capital for the use of others who have not saved, when he has accumulated so much for his own use as to have little to gain from the production for his own use alone of more. In other words, he cannot devote himself entirely to production for the future, e. g. to making a boat, and expect to trade the results of his labor for present income, e. g. fish. Neither can he, if he would have any tools of production, devote himself entirely to producing consumable goods and trade these with anyone else for production goods. Could he do these things, the rate at which he would trade the one

kind of goods for the other might well be influenced by his alternative of himself producing the other. Thus, the rate at which he would exchange consumable goods for capital might well be affected by the alternative of his producing that capital. There are, of course, points of similarity in the position of a Crusoe and a man who is part of an industrial society, but it seems nevertheless necessary, fully to explain the phenomena of interest, to consider the rate of interest in the light of the various possible exchanges and alternatives which have a bearing upon it. In particular, we shall examine the bearing, on the rate of interest, of the productivity of capital and of impatience or the indisposition to save.

§ 2

The Demand for Present Goods

Indirect or roundabout production differs from direct production in that it requires waiting. Therefore the surplus of relatively roundabout production, at the margin beyond which it has not been carried, over what the same labor would yield if directly applied, we may term the marginal product of waiting. Thus, if a given amount of labor can yield an immediate product of 100 or can, by being stored in capital, yield a product one year later of 110, then the surplus product, 10, may be spoken of as the marginal product of "waiting." If we measure waiting by amount of gratification postponed and duration of postponement,[2] we may

[2] Suggested by G. Cassel, *The Nature and Necessity of Interest*, London (Macmillan), 1903, p. 42.

say that the marginal product of waiting is, in this case, 10 per cent. In practice, roundabout production involves the cooperation of later labor with the capital which earlier labor has produced. Hence when we suppose that labor turned to roundabout production will produce (say) 10 per cent more than the same amount of labor turned to direct production, we do not mean that this year's labor, for example, will produce capital which, a year later, and without any co-operation of further labor with it, will yield a product 10 per cent larger than could have been produced directly. We mean, rather, that if the "center of gravity" in time, of the receiving of the product of the labor, is a year later than the time center of gravity of the putting forth of effort, the product will be 10 per cent larger than if it is received currently with the application of the labor. To illustrate, suppose that labor is put forth daily for three years but that for the first two years no consumable return is derived, the return being realized throughout the third year, during which the capital produced is operated and wears out. The time center of gravity of the labor would then be a year and a half from the beginning of the process and the time center of gravity of receiving the consumable return would be two years and a half from the beginning. The return may therefore be said to be received a year later than the labor is put forth.[3] And if

[3] See Böhm-Bawerk's explanation of an "average production period," *The Positive Theory of Capital,* English Translation,

this return is 10 per cent larger than could have been secured by carrying on direct production and getting consumable goods currently throughout the three years, then the marginal product of waiting may be said to be 10 per cent. In the abstract discussion which is presented in this and the next few sections of this chapter, the expressions "this year's labor" and "present labor" may be understood to have reference to labor of which the time center of gravity is in the present, and expressions relating to "present goods" or "next year's goods" may be also interpreted in terms of a time center of gravity.

We have seen that roundabout production yields a surplus over direct production. By so doing it affects simultaneously the rate of interest and individual rates of impatience (rates of preference for present goods over future goods). We shall see, as we proceed, that it does not affect the former primarily by first determining the latter. To show how greatly the productivity of waiting can influence interest, let us assume that indirect production could be indefinitely extended without reducing the reward of marginal waiting below 10 per cent. Then the rate of interest could not be less than 10 per cent, nor could individual rates of impatience be less, and the marginal productivity of waiting might be said, in so far, to determine both. It determines interest by affecting both the demand and the supply sides of the market. It determines impatience by causing the

London (Macmillan), 1891, p. 89. Cf. Jevons, *The Theory of Political Economy*, fourth edition, London (Macmillan), 1911, pp. 227-229.

adoption, to a considerable degree, of roundabout production, and therefore making present income relatively scarce and future income relatively abundant. Thus impatience is increased.[4]

Putting the matter in terms of demand for and supply of present goods, we may say that if the indirect method would yield continuously, and even though indefinitely extended, a 10 per cent surplus, then a rate of exchange of less than 110 of next year's goods for 100 of this year's would mean a demand for present goods in excess of the supply. On the demand side, if the marginal product of waiting is equal to 10, the possibility of getting 100 of present goods for 105 of next year's goods, would mean a greater demand for the present goods than if the marginal product of waiting were but 5. For all those classes of persons, *e. g.*, spendthrifts and necessitous persons such as laborers, who, in effect, habitually buy present goods with future, would have, with the higher assumed productivity of the roundabout methods at which they are engaged or to which they can turn, more future goods to offer for present. At a rate of exchange of 105 future for 100 present, they would, in producing 110 future and buying 100 present, have 5 of future, *i. e.*, next year's goods, left over with which to demand more present goods; whereas if roundabout production were only 5 per cent superior, this surplus demand for present goods could not exist. Thus, with a marginal productivity of waiting equal always to 10 per cent,

[4] See Böhm-Bawerk, *Positive Theorie des Kapitales*, Dritte Auflage, (Innsbruck), 1912, p. 468. Cf. Fisher, *The Rate of Interest*, New York (Macmillan), 1907, pp. 186, 187.

necessitous wage earners, if they received 100 of present goods for every 105 of next year's goods produced by their work, might be said to demand more present goods than if the marginal productivity of waiting were only 5 per cent. For in the former case they still have a future product of 5, after getting 100 in present goods, for which surplus 5 they demand a further quantity of this year's goods. We may therefore assert that the higher is the marginal product of waiting and the more slowly this marginal product declines with increased quantity of waiting, the greater will be the demand, at any given price or value in future goods, for present goods. This is a use of the term "demand" analogous to its use in the theory of price and value. Unfortunately, economists are apt, in such discussions as the present, to use the terms "supply" and "demand" loosely and without careful analysis.

It should be observed that this greater demand for present goods, at a rate of 105 of next year's goods for 100 now, due to the 10 per cent superiority of indirect production, is not, necessarily, brought about through any effect on impatience. The greater demand for present goods at any rate of interest less than 10 per cent may be due directly to this superior productiveness of the capitalistic method, or, if we use Böhm-Bawerk's phrase, to the technical superiority of present goods. Let us suppose, for illustration, a man who must have 100 this year in order to maintain life. He does not possess it and if he cannot borrow it, will have to produce it. But if he can borrow it he will then be in a position to turn his attention towards

roundabout production, which, otherwise, he could not possibly do; and he will therefore be able to produce 110 a year later with the same labor required to produce 100 this year. Will he not, if interest is 5 per cent (or anything less than 10) be very glad to get 100 of present goods and so be able to produce 110 a year later? Yet this will not of necessity be due to his impatience. He may be a man who, were any other way possible of getting the 110 next year, would refuse to borrow 100 even at only one per cent interest. He may have so little impatience that even an income stream rising at such a rate as 10 per cent, would not induce him to seek present goods for future. He may have a zero rate of impatience, if not a negative one. If he borrows 100 for this year's use, in order that he may work hard at roundabout production when otherwise he would do an equal amount of work in securing 100 in this year's goods, it certainly cannot be said that he borrows in order to provide for present needs out of future abundance, for his present needs are *no better provided for* than if he did not borrow. He works just as hard and has this year no greater income. The fact is *that such a man does not borrow because he is impatient and wants more present income at the expense of his future.* In borrowing, he really is not comparing this year's 100 with next year's repayment of 105, for he could get this year's 100 for the work he is in any case doing. He is comparing the 110 which roundabout production will yield him next year, with the 105 of next year's goods (or anything less than 110) which he must pay for the 110. *He is comparing*

two futures, rather than a present and a future.[5] He is going to have 100 this year whether he borrows or not. He is going to do a given amount of productive work this year whether he borrows or not. If he borrows he simply makes the difference between 110 and what he has to pay next year for the loan. In what possible sense can it be said that he borrows only because he is impatient?

Here we may note an error in Fisher's criticism of Böhm-Bawerk, though one which appears to lurk in the latter's own presentation of his theory. Professor Böhm-Bawerk in his *Positive Theory of Capital*[6] has a series of tables illustrating the technical superiority of present goods, the point being that early goods are to be preferred to later because they make possible more roundabout production, *e. g.*, to use the figures of this article, that 100 this year is preferable to 100 next year, because 100 this year makes possible 110 next year, through the adoption of roundabout processes. Fisher's argument is, in effect,[7] that 100 now would be no better than 100 next year, if man were not impatient, because 100 next year would make possible 110 year after next; that as much would be enjoyed eventually, and so if one did not mind waiting, either option would be as good as the other. Professor Fisher's statement[8] is that "the only reason any-

[5] Cf. Böhm-Bawerk, *Positive Theorie des Kapitales*, Dritte Auflage 1912, (Exkurse), pp. 406-409.

[6] *The Positive Theory of Capital*, English Translation, London (Macmillan), 1891, pp. 262-269; Dritte Auflage, 456,466.

[7] *The Rate of Interest*, pp. 58-71.

[8] Ibid., pp. 70, 71.

one can prefer the product of a month's labor invested today to the product of a month's labor invested next year is that today's investment will mature earlier than next year's investment." In view of what has been said in the foregoing pages, it seems to the present writer that this criticism really fails to meet the essential point of the argument. So long as 100 this year makes possible 110 next year, many persons will be very anxious to get the 100 provided they do not have to pay back quite all of the 110. Their total income will be larger and not merely earlier because of such a choice. A proper comparison of the two options begins *with the present in both cases,* not, as Professor Fisher would have us believe, a year later in one case than in the other. In either case, income and work would begin with *this year.* In the one case the loan of 100 would make possible beginning the more productive indirect method at once. In the other case the first year would have to be spent in the use of the less productive direct method. All question of impatience aside, the first choice would be preferable to the second since it would yield during any given period, a greater total result.[9] Nevertheless it must be admitted that Böhm-Bawerk's tables do not all consistently express this view.[10]

[9] See Böhm-Bawerk, *The Positive Theory of Capital,* English Translation, p. 271; Dritte Auflage, p. 469. See also Exkurse XII, in answer to Fisher's criticisms.

[10] Thus, in the tables beginning on page 266 (English translation), Böhm-Bawerk selects for comparison the maximum value incomes derivable from earlier and later labor even though this means comparison of an income received in 1890 from labor availa-

Professor Fisher, in attempting to show that all loans are really made to provide present income for those who desire the loans, even if they are so-called productive loans, assumes the case of a business man who borrows to make an investment and who has the three options of not investing, and of making the investment by sacrificing part of his early income for the sake of later or by borrowing so as not to have to sacrifice early income.[11] But in our example above described, the borrower has but the first and third of these options. If he cannot borrow, he cannot invest, that is, he cannot choose roundabout production. It cannot be said, therefore, that he borrows to supply present needs, and it cannot be said that borrowing, in general, is necessarily a means of providing the present at the expense of the future, but that there really are, contrary to the viewpoint of Fisher,[12] productive loans in the sense in which economists have used that expression. Impatience is only one cause, and perhaps a minor cause, of the demand for present goods.

In concluding, now, our analysis of the demand side of the market in so far as it shows a tendency of productivity of waiting to keep interest up, may we not state a quantitative result? Assuming that the marginal productivity of waiting, however far extended, is 10 per cent, and that the supply of

ble in 1888 with an income received *in 1893* from labor available in 1889.

[11] *The Rate of Interest*, pp. 246-251.

[12] Ibid., p. 251.

present or early goods is not unlimited, may we not assert that *at a rate of interest appreciably less than* 10 *per cent, the demand for present goods or relatively early goods, must exceed the supply?* For even those who are not by nature so *impatient* as to purchase present goods for future at that rate will nevertheless purchase present or comparatively early goods, that they may extend the amount or the time of indirect production and reap a gain in so doing.[18]

§ 3

The Supply of Present Goods Offered for Future Goods

On the other hand, a high marginal productivity of capital or of waiting tends to decrease the supply of present goods, at any given price in terms of future goods. Thus, with the marginal productivity of indirect production 110, however far extended, as against 100 for direct, nobody would supply

[18] The contention is sometimes made by productivity theorists that increased productiveness of capital must be assumed to raise the rate of interest *because* value is relative and *all* values cannot go down (Seager, *The Impatience Theory of Interest,* American Economic Review, December, 1912, pp. 834 and 835). Even though the supposition be made, for greater clearness of exposition, that the quantity of money and credit keeps such a relation to goods as to maintain an unchanging general price level, such an argument is hardly sufficient. For the impatience theorist might still argue that the value of capital would go up and the value of consumable goods down because of the increased capital productiveness, and that interest would not rise. Some such argument as is presented in this chapter is believed, therefore, to be essential if the problem is to be anything like completely analyzed.

present goods at all if offered a price of only 105 in next year's goods for 100 present. If roundabout production yielded less, say 4 or 5 per cent, such an offer might bring out a supply of present goods. But with roundabout production yielding a 10 per cent yearly surplus, it would not be worth while for any one to produce present goods at all in order to make such an exchange. Rather than produce present goods to the amount of 100 and exchange or sell them for 105 of next year's goods, any producer would prefer to get, by the indirect method, 110 of next year's goods. We may put the matter in a somewhat different way if we first call attention to the fact that wages are paid, in the first instance, neither in present consumption goods nor yet in future goods (durable capital) but in general purchasing power. The amount that an employer has to pay in wages will, presumably, be the same whether he employs his men in direct or indirect production, in producing present or future goods. But if employing them in indirect production will yield 110, no employer is going to pay the same wages for present goods of 100, and then supply these goods for the equivalent of 105 in the goods of a year later. An employer will either receive for his 100 a purchasing power over 110 of next year's goods, or he will have next year's goods produced instead of present goods. It appears, therefore, that if indirect production can be indefinitely extended with a surplus return of 10 per cent, any appreciably less rate of interest than 10 per cent would certainly mean a supply of present goods less than the demand. Therefore

a rate of appreciably less than 10 per cent could not continue.

It is worth while calling attention again at this point to the fact that we are dealing here with an independent cause of interest other than impatience. It is not, in our example, because those on the supply side of the market are impatient, that they will not dispose of 100 present goods for less than 110 of next year's goods. It is rather because nature or invention or, more properly, both, gives them the option of getting the 110 next year, through their own present efforts, if they will, instead of by lending or selling present goods for future. Is a man impatient because he will not accept 105 of next year's goods when he may, by the same present effort, get 110? The choice is between a smaller future income and a larger, not between a present and a future income. How, therefore, can impatience be said to be involved as the cause? Impatience or time preference is a state of mind relating to present compared with future goods; not related to future compared with other future goods.

The above argument shows, it is believed, that productivity of capital has both a direct and a proportionate effect upon the rate of interest, if by productivity we here mean surplus productivity over direct production. To double the surplus productivity of any one instrument of capital would not, of course, appreciably affect the rate of interest, because it would mean but a slight change in the market conditions of supply and demand. The increased supply of products or uses would, if the capital were itself produced by

labor, merely lower their price in relation to other goods. But permanently to double the surplus productivity of capital in general, in other words to double the marginal product of waiting and to keep this marginal product, however great the increase of waiting, double what it has been, would, and must, not less than double the rate of interest. For if the surplus marginal productivity of capital were changed from 10 to 20 per cent, no one would any longer, however low his impatience, consent to lend or invest present goods for 10 per cent. Rather would he adopt indirect production and realize 20. His refusal to accept 10 would not be due, necessarily, to his impatience but directly to the fact that he has now a better option than before. The assertion that[14] "to raise the rate of interest by raising the productivity of capital is, therefore, like trying to raise one's self by one's own boot-straps," hardly gives a true account of the situation even though only a direct and not an indirect effect is denied. Neither is it convincing to state that[15] "an increase of the productivity of capital would probably result in a decrease instead of an increase, of the rate of interest," and that "to double the productivity of capital might more than double the value of the capital," unless by productivity is meant productivity in general and not merely the surplus productivity of indirect

[14] Fisher, *The Rate of Interest*, p. 15.

[15] Fisher, *The Rate of Interest*, p. 16. But it is only fair to state that Professor Fisher's elaborated theory gives considerable emphasis to productivity as an indirect cause working through impatience.

production. As a matter of fact to double the surplus[16] marginal product from 10 to 20 and keep it so, would very decidedly not double the value of capital. For no one, however low his impatience, would be willing to give more than 100 in present goods for 120 of next year's goods when the labor necessary to produce the present 100 would be sufficient to produce the deferred 120. It is true that such an increase of productivity as we have assumed might, when it had greatly increased wealth, tend to reduce impatience and therefore, eventually, to make possible an extension of indirect production to where the marginal product of waiting was a smaller amount than before. But unless and until it did this, the greater productivity could not possibly result in a decrease of the rate of interest. And it is certainly not true as Professor Fetter would have us believe, that a theory which asserts productivity to be an independent, direct cause and determinant of interest must assume a rate of interest in its premises and so involves a begging of the question.[17] It starts with a rate of interest only in the sense that it starts with a rate of productivity which in large part determines the rate of interest. Even the productivity theorist who asserts, flatly, that interest will be 20 per cent if a capital of 100

[16] If the surplus marginal product is 10, the total marginal product of capital is 110. To double this would make it 220, increasing the surplus marginal product, or the marginal product of waiting, to 120.

[17] See, for example, Professor Fetter's critical article, *Interest Theories, Old and New*, in the American Economic Review, March, 1914, especially page 90.

produces on the average, at the end of a year, an income of 120, though his analysis may be incomplete, is not, perhaps, fundamentally in error. For it is not necessarily true that a person values his capital at 100 only because, having an impatience of 20 per cent, he discounts the expected income at a 20 per cent rate. On the contrary, he values his capital at 100 because the amount of labor necessary to produce it, *i. e.*, necessary to get a final result a year later, of 120, is just equal to the amount of labor necessary to get 100 right away. He does not value the capital at more than that, *i. e.*, will not give more than that for it, because he has the option of always being able to get it at that price or value in terms of labor. The sum 100 may properly be called its cost of production. In this sense it is fair to say that interest is 20 per cent if and because a capital of 100 will produce income at the end of a year, of 120, or will produce 20 a year. We may say that a person's valuation of capital, along with the valuations of other persons in like situation, is less the direct result of a previously existing market rate of interest, than it is, by affecting his and their attitude towards the market, a determinant of the rate of interest.

We are prepared, now, to see more clearly than before the importance of the distinction between land and made capital. Land is already present. For the most part there is no balancing of choice as to whether or not we shall produce it. Its value depends upon its expected future benefits and the rate of interest or impatience at which they are discounted. But there is the option, during any period, of producing more or less of other capital,

turning towards or away from roundabout production. The value of this other capital is just as much dependent upon its cost of production, in the sense above explained, as upon any independently existing rate or rates of impatience. The possibility of getting a larger product of labor, a surplus over the reward of direct production, by applying that labor indirectly, with, as an intermediate step, the use of "produced means to further production,"[18] will tend to prevent enterprisers and others from accepting any less surplus as interest on loans or on purchase of goods already produced. This possibility will therefore, in so far, tend to fix the rate of interest and of discount.

Does impatience then enter nowhere into the chain of cause and affect? It does enter, but, in the connection to be now emphasized, as effect rather than cause. The marginal productivity of waiting, if 10 per cent regardless of extension, will directly influence supply of and demand for present goods in such a way that, at any lower interest rate than 10 per cent, supply will fall short of demand. It is also true that a marginal productivity of waiting, of 10 per cent, will cause rates of impatience to be correspondingly high. The supply of and demand for present goods, and hence the rate of interest, is one chain of effects following from the marginal productivity of waiting. The comparative deprivation of the present and endowment of the future and the consequent high rate of impatience, constitute another chain of

[18] Phrase used by Seager, *The Impatience Theory of Interest*, American Economic Review, December, 1912, p. 846.

effects. We are here dealing with common effects of a joint cause, not with a single chain of causation.

§ 4

Demand for and Supply of Present Goods Further Considered

On the other hand, still assuming a marginal product of waiting equal to 10 per cent, and assuming now that it does not become greater than that even with indefinite decrease of roundabout production; then at a higher rate of interest than 10 per cent, we should expect to find demand for present goods less than supply. If the rate of interest were 15 per cent, that is if the price of present goods in terms of future were 115, comparatively few persons would be willing to buy present goods. Why offer 115 of next year's goods for 100 of this year's when 100 of this year's can be produced by the direct method in the same time that it takes to produce only 110 of next year's. There might be persons of spendthrift habits and no trustworthiness who would be willing to promise almost any price in future goods in order to get 100 in present goods. But such persons could not be relied on to pay the price and, therefore, are not really in the market. They have a desire rather than a demand. There might be a real demand for present goods at a 15 per cent rate from persons of spendthrift proclivities who, by past accumulations or by inheritance of capital, possessed the means to pay. But such persons would soon eliminate themselves as factors in the

problem, and even while they were in the market, conditions of supply would keep interest down to about 10 per cent. The great mass of consumers would not be in a position to give, as a rule, more than 10 per cent. Most of them are wage earners and in many cases they have little security to offer. They buy present goods, in effect, with the future goods their labor produces. That is their chief and in many cases their only means of purchase. If the same labor which produces 110 of next year's goods by the indirect method, would produce directly 100 of this year's, they would not bid for the 100, an amount equal to 115 of the goods available a year later. Rather than do this, they would seek employment producing directly this year's goods and so avoid the 15 per cent interest.

Looking at the matter from the supply side, we may say that a rate of interest of 15 per cent when the marginal product of waiting is 10 per cent, would almost certainly result in a supply of present goods in excess of the demand. For no one would produce 110 of next year's goods, however little impatient he might be, so long as he could produce with the same labor, 100 of present goods and sell them for 115 of next year's. No one would hire labor to produce 110 of next year's goods when for the same wages he could hire them to produce 100 of this year's and could sell this 100 for 115 of next year's. In short, at a rate of interest of 15 per cent, the supply of present goods would exceed the demand, by the turning of quantities of labor from indirect to direct production, until the large amount of early income and the scarcity of future income, lowered interest and

impatience to 10 per cent. The influence of supply would keep interest as low as 10 per cent for all those able to give security and therefore really in the market, unless mankind were so little thrifty that no amount of turning production to the direct method, no possible stocking of the present and deprivation of the future, could keep their impatience down to 10 per cent, the assumed productivity of waiting. In such a world or such a community, there soon would be no indirect or capitalistic production, but a mere living from hand to mouth; and there could be no loans except the so-called unproductive loans.

We may conclude, therefore, that by acting on the supply of present goods and the demand for them, the superiority of roundabout production tends to keep interest down to as well as up to the marginal productivity of waiting. Interest to those really in the market (because able to give security), cannot go above this per cent so long as a community is thrifty enough to use any degree of indirect production, and is therefore able to increase present goods and decrease future by turning more largely toward direct production. And it cannot go below this, so long as a community has still not reached an impassible limit of indirect production but is yet able to turn more labor toward indirect production or to make the method of production still more roundabout,—to increase either the amount or the time, of waiting.

Assuming, therefore, a constant marginal productivity of waiting, equal to 10 per cent, and a rate of impatience affected by the shape of the income stream, this rate of impatience, as well as the

rate of interest, will adjust itself to the rate of productivity of waiting. On the other hand, were we to assume a constant natural rate of impatience regardless of changes in the income stream, and at the same time a productivity of waiting decreasing with the extension of indirect production, *then the marginal productivity and the rate of interest would adjust themselves to the impatience.* In practice, doubtless adjustment takes place both in marginal productivity of waiting and in impatience, but the influence of productivity has, it is believed, an importance which we are not likely to overemphasize.

In a modern community production is capitalistic to a great degree. It would be possible to make it capitalistic to an indefinitely greater degree with continuing gain in productiveness. We are little interested in the theory of how interest might be fixed in a community where the general rate of impatience is too high to permit any accumulation at all, or in a world where further extension of indirect production is impossible. In our existing civilization, the fact that capitalistic production could be much further extended, with, for a long time at least, a surplus gain, is of tremendous importance. It means that no amount of accumulation can be expected to reduce the rate of interest to zero.[19] It means that the marginal product of waiting is one of the most important factors in fixing the rate of interest, worthy of the emphasis which the marginal productivity theorists have

[19] Cassel, *The Nature and Necessity of Interest,* London (Macmillan), 1903, pp. 156, 157.

given to it, and that any theory which does not give large emphasis to this determining influence acting simultaneously on impatience and interest is either inadequate or misleading or both. It means that if the productivity of waiting were a given per cent regardless of an indefinite substraction from or addition to the supply of waiting, then that productivity would, in a modern civilized community, fix both interest and impatience at its own exact per cent. It means, in short, that impatience is not the fundamental cause of modern interest nor even a cause through which all other causes must operate, but that it is one of two coördinate causes and is also to some extent a joint consequence, with interest, of the other cause, the superiority of indirect production.

It may be worth while again to emphasize the importance of a correct use in this connection of the terms "supply" and "demand." Marginal productivity is not to be looked upon as having to do chiefly with demand nor is impatience to be regarded merely as putting a limitation on supply.[20] Neither is it correct to regard productivity merely as an explanation of why interest can be paid and impatience as a reason why it must be.[21] As we have seen, the marginal productivity of waiting *determines the supply of present goods, in the proper sense of "supply," quite as much as it*

[20] This appears to be the view of Carver, expressed in *The Distribution of Wealth,* New York (Macmillan), 1904, p. 224, and of Cassel (*The Nature and Necessity of Interest,* pp. 37, 45, 49).

[21] This seems to be the mode of treatment adopted in Ely, *Outlines of Economics,* New York (Macmillan), 1908, pp. 418, 419.

determines the demand; and impatience, so far as it operates as an independent cause, affects the demand of those who desire present goods as well as the supply offered by those willing to take future goods.

§ 5

A Concrete Illustration

To picture concretely the determination of a rate of interest, we may betake ourselves to Crusoe's island after the addition to the island's population of the group of Spaniards. The unimproved land is valueless. It is all "marginal" or "no-rent" land. One acre is as good as another and the supply is more than ample for all who live on the island.

But on part of the land, Crusoe has made valuable improvements. Among other things there are some trees of a certain sort, which yield nutritious fruit once, a year after being planted, and then die.[22] On an average there are 110 of the fruit to a tree. Young trees, suitable for planting, grow on a neighboring island, as does also the fruit. This other island is not a suitable place for a permanent habitation. But it can be availed of for its products, and can be reached from Crusoe's island, except at high tide, by fording. At first, Crusoe went to the neighboring island, at picking

[22] This assumption is made only for simplicity. It is apparent that the principles involved would be no different on the supposition of (say) a thirty-year life and a yield each year after the tenth. But so complicated an illustration of the principle would make the argument more difficult to follow.

time, for the fruit of these trees. But he soon found that it took him 10 trips to bring over, with considerable effort, 1,000 of the fruit, because of his limited carrying capacity; while 10 trips or, all things considered, an amount of labor equivalent to that required to bring 1,000 of the fruit, would enable him to bring over and plant 10 young trees. The next year these would yield, altogether, 1,100 of the fruit. Conditions of moisture, fertility, etc., are such that the trees have to get their start, as seedlings, on the neighboring island. Hence a new supply has to be secured each year. But, though it involves a year of waiting, the same amount of labor yields Crusoe 10 per cent more by this roundabout method than by the direct.

Enter now one of the Spaniards. Crusoe has just planted his year's crop of 10 trees. The Spaniard, who, in order to accumulate some capital of his own, is doing more work than is necessary to satisfy his present needs, would like to buy. Crusoe demands payment in terms of the kind of fruit the trees yield. One year hence the trees will yield 1,100 of the fruit without appreciable further labor. How much of the fruit are they now worth? How much will the Spaniard give? How little will Crusoe take? Is the question solely one of time-preference with each, or is something else involved in this *valuation of capital?*

We may begin with the Spaniard. His position is analogous to that of a lender. If he buys the trees, he will be giving up present fruit for future fruit. What is the most he will give? He will be guided in his decision by two considerations. *One* of these is his impatience or *time-preference.*

The other is the *cost-of-production* (in the place desired) of the trees. If he dislikes to sacrifice present goods for future unless he gets a return of (say) 5 per cent, he certainly will not give 1,100 of the fruit now for 1,100 a year from now. Even after he has gathered enough fruit, from the neighboring island, to buy the trees, he will refuse to buy them at any price above 1,048, and this refusal may be due to his time-preference. But will he give 1,048 if and because his impatience is only 5 per cent? By no means. For he has to deal with the fact that the same number of trips to the neighboring island and the same amount of labor, which will yield him 1,000 pieces of fruit, would get him 10 trees and plant them. If he has to pay Crusoe 1,048 pieces of fruit, he must work harder and make more trips, to get the means of buying the trees from Crusoe, than to get trees directly. He, therefore, however low his rate of time-preference, will refuse to pay more than 1,000 fruit for 10 trees, so long as he can get and plant 10 trees for himself with the same labor as is required to get the 1,000 fruit. His refusal to give more than 1,000 is not due to high time-preference for present goods but to his desire to get future goods in the cheapest way possible. It is not time-preference at all, but a choice between two different amounts of present labor, yielding the same future result. This is the sense in which the value of capital depends upon *cost-of-production.* The value of the trees cannot go above that amount of other goods which requires the same labor to get *directly,* as the trees do. The goods which could be got directly with the same labor and which must

be sacrificed for the present if the trees are directly got instead, may be regarded, in an entirely proper sense, as the *cost-of-production* of the trees. The essential fact is, then, that the prospective purchaser of capital has a choice among not less than three lines of action and not between two only. He is not, as the time-preference theorist would have us believe, restricted to a choice between the present fruit and the future fruit. Instead, he can have the present (*i. e.*, the early or this year's) fruit, or he can have next year's fruit from the purchased trees, or he can have next year's fruit from trees which his own labor procures. Not only the preference for present (or early) consumption will cause him to refuse to pay a too high price for Crusoe's trees; but also his other alternative of producing (in the economic sense of producing—in this illustration, place utilities) the trees by his own labor, will cause him to refuse to pay a too high price in the other possible products of such labor.

We reach a parallel conclusion if we suppose that the Spaniard, instead of buying trees of Crusoe the capitalist, employs Crusoe as a laborer to get the trees, paying him in present fruit. The Spaniard will not be willing to pay Crusoe more than 1,000 fruit for the labor of getting or planting 10 trees. Rather than pay wages appreciably higher, he would himself get and plant the trees desired. To be an employer of labor, advancing present consumable goods for durable capital, he must produce present goods in excess of his own present needs. *But he has the alternative of devoting his surplus time, instead, to the production of durable capital*

which will serve his future needs. This possible alternative will make him unwilling, however low his time-preference, to accumulate present goods for the payment of wages, unless his future return from so doing is equally large.

Likewise, if we suppose him to lend to Crusoe, the rate at which he will lend is influenced *directly* by his other alternative, and not merely by his time-preference or by his other alternative acting through the intermediation of time-preference. He will not lend Crusoe 1,000 fruit this year for much less than 1,100 next year, however low may be his time-preference, because the labor necessary to secure him the surplus 1,000 this year above present needs will, if turned to more roundabout production, yield him a return next year of 1,100. He would rather get 1,100 next year as a result of this year's labor in roundabout production, than to get *less* than 1,100 next year as a result of this year's labor in supplying Crusoe's present needs. There is no intention to deny that the surplus productivity of roundabout production also influences time-preference, by influencing the relative endowments of present and future.[23] Neither is there any intention to deny that the rate of time-preference, by influencing the extent to which roundabout production is carried, affects the marginal gain from such production. The rate of interest fixed by market competition will also be the rate of time-preference and the rate of surplus productivity of roundabout production. But to

[23] See Böhm-Bawerk, *Positive Theorie des Kapitales,* Dritte Auflage (Innsbruck, 1912), p. 468.

assert this is not to assert that time-preference is the sole proximate cause and that all other causes must act through it. As we have just seen, the rate of productivity influences *directly* the supplier of present goods; and the cost-of-production of capital, in the sense here used, has a *direct* influence on the demander of such capital.

Suppose, now, we turn to Crusoe's side of the market, the side of the person who purchases present goods with future. What determines the price at which Crusoe will dispose of his 10 trees, or rather, since this is the important question in the long run for capital valuation, at what price in present fruit will Crusoe be willing to engage in the business of getting, planting, and selling trees? Crusoe, we may suppose, is now permanently on the present goods side of the market. He is no longer accumulating capital and has, perhaps, lost or dissipated what he had. If he produces durable capital, it is only to dispose of it for present consumable goods. Let it be understood that we are not assuming Crusoe to be a middleman. On the contrary, he is here the "ultimate consumer." But he is also a producer. He wants present goods, present fruit. To get this fruit, he must either go to the neighboring island and bring it over *or* he must buy it of somebody else by offering future goods. Once he has produced these future goods, i. e., secured and planted the 10 trees, time-preference may alone decide at what rate he will exchange them for present fruit. But *before he turns his labor in that direction,* he will consider whether he can get more present fruit by producing durable capital to buy it with or by devoting the same

labor to getting the present fruit. Year in and year out Crusoe will not maintain the supply of more durable capital, i. e., will not produce it for sale, except at a price which is as satisfactory to him as the yield of direct production of present goods. The labor necessary to get the 10 trees is the same, on our hypothesis, as the labor necessary to get 1,000 pieces of the fruit. The 10 trees, planted near by, yield next year 1,100 pieces of fruit.

Crusoe's rate of time-preference of course fixes a minimum below which he will not sell the trees. If his rate of time preference is 15 per cent, he will not sell them for less than 956 fruit, because he would rather wait for the 1,100 future fruit. But, in the long run, his minimum price is fixed by *two* considerations and not by one only. The second consideration is his alternative of directly producing the fruit by going to the neighboring island after it. Year in and year out, he will not bring, plant, and sell the trees for less than 1,000 of the fruit. If he cannot secure approximately that price for the trees, he will get the fruit directly instead of trading for it. The possibility of his doing so will itself tend to keep the trees scarce enough to yield that price in terms of the fruit. In other words, he will not sell the trees for less than their cost-of-production measured by the other goods which the same work would produce.

Our conclusion is no different if we assume him to sell his services as a laborer, for wages, instead of selling the trees. He will not work for the Spaniard at the job of getting and planting trees, for a less wage in present fruit than the amount

of present fruit which the same labor would give him if applied directly to bringing the fruit from the other island.

But instead of selling trees for present fruit or working for wages in present fruit, Crusoe may borrow present fruit to pay it back next year. Here, also, if he is a *productive* borrower, he is not simply comparing present and future benefits. If he has no accumulations and if, also, it requires all his present labor to provide for his present needs, Crusoe must needs engage in direct production unless he can borrow. If he can borrow 1,000 present fruit, he is relieved from the necessity of getting fruit now for present needs and can get the trees instead. But more than 1,100 fruit next year for 1,000 fruit this year, he will not give, since the former represents *more present labor than the latter.* Only an unproductive borrower would make such a contract and he would soon be eliminated from the market. On the other hand, however low might be his time-preference, Crusoe would still be willing to borrow at any rate of interest less than 10 per cent. To do so would leave him as well off in the present and better off in the future. He would borrow at less than 10 per cent because to do so would give him a larger future income than not to do so. His comparison would be *between two futures, rather than between a present and a future.*

Let us now turn again to the distinction between land and capital. The distinction is not, strictly, one between land and all other capital. It is a distinction rather between reproducible and non-reproducible goods. The paintings of old masters

and business sites in New York City are in the same category. For all practical purposes, they cannot be reproduced. It is not intended to argue that there is no "made land" or that land owes none of its value to work upon it. But so far as its characteristics cannot be reproduced, the value of land is not limited by its cost-of-production. Crusoe could not sell his 10 trees for more than 1,000 pieces of fruit, for that was their equivalent of their cost-of-production. But if the island were crowded, and there were no practical possibility of adding to the land, no such definite limit would determine a minimum price of the land in terms of other goods. The value of this land could be arrived at only by discounting the prospective value of its future yield. The value of reproducible capital is influenced by *two* considerations; that of capital *not* reproducible, by *one*.

§ 6

Interest in a Money Economy

It should not be difficult to translate our results into terms of a money and money price economy. In such an economy, fruit or other consumption goods would not be directly borrowed. The borrower would seek, instead, the amount of money necessary to purchase such goods. Trees would not be directly traded for fruit nor would the labor of planting trees be paid for in fruit. Instead, the seller of trees or fruit or labor would receive money and the buyer would pay money. But the ultimate result would be the same since the seller of one good is the buyer of another. In order to

make plausible the assumption of a money economy on Crusoe's island, let us suppose its population to have materially increased so that others than Crusoe and the Spaniard are engaged in productive effort. The Spaniard now will not pay for Crusoe's 10 trees more *money* than he can get for his 1000 pieces of fruit. He might better, himself, become a producer of trees and let Crusoe or others go after fruit. Likewise, Crusoe will not intentionally produce the 10 trees for sale at a lower price in *money* than could be realized by the sale of 1000 pieces of the fruit. So, also, if the Spaniard contemplates borrowing, not the 1000 pieces of fruit necessary to support life while fetching and planting the trees, but the amount of *money* necessary to buy the fruit, he will not consent to repay more, as principal and interest, than the expected money value, next year, of the 1100 pieces of fruit which his present efforts will then yield him. Nor will Crusoe, as a lender, consent to take much less, since he might rather himself expend his money for the fruit which he would then not have to produce to satisfy his present desires. By so doing Crusoe would be relieved of the necessity of gathering fruit, would be able to plant trees instead, and could secure, next year, the reward of his roundabout production. With the use of money or without it, the rate of productivity of waiting is an important determinant of interest. If the relative difficulty of producing fruit directly and of producing trees remains unchanged during the year, that is, if the per cent marginal return to waiting in the industry in question is constant, then the relative money prices of fruit and trees

will remain unchanged. Unless, therefore, the money prices of both change, the percent gain from roundabout production, measured in money, and the rate of interest realized in money, will be the same, respectively, as the per cent gain and the rate of interest realized in fruit. In a later section[24] reference will be made to some of the effects of the fluctuating value of money. But these effects, though they may lead us to qualify, will not lead us to cast aside the results of the foregoing analysis. The connection of the surplus productivity of roundabout processes as a cause with the rate of interest as an effect is too fundamental to be successfully controverted.

§ 7

Changing Bank Reserves in Relation to Interest

A large amount of money carries with it in a modern country, a large amount of bank credit. A part of the money in a modern community takes the form of bank reserves, and the credit which banks can lend with safety is a more or less definite multiple of these reserves. Also, as a matter of business convenience, individuals and corporations preserve a more or less definite ratio between their cash assets and their checking or commercial bank credit accounts.[25] If, therefore, the quantity of money should double, we might very reasonably expect the volume of bank credit to double likewise, and prices to double. The new

[24] §8.

[25] See Fisher, *The Purchasing Power of Money*, New York (Macmillan), 1913, pp. 50-52.

condition of equilibrium, when reached, would be one in which the amount of money in circulation, the volume of bank credit, and the amount of money in bank reserves, were all larger in the same proportion (double) and in which, therefore, these quantities had the same ratios each to each as before the increase.[26] With a large quantity of money, interest would be the same as if there were less money[27] and with a *change* in the quantity of money interest would *eventually* be the same as if the quantity of money had not changed. But with a *change* in the quantity of money there are likely to be certain disturbing transitional effects on the loan rate of interest, to which at least brief consideration ought to be devoted.

When the amount of money increases rapidly and largely, the new money goes at first, for the most part, into the banks. If it comes from the mines, the mine owners can do little else than deposit it. Even if they put the money into various investments, the receivers of the money can do little else than deposit it in commercial banks. They may choose to use a fifth or a tenth of it as money in current transactions, but they will probably prefer for their larger transactions to use checks. Hence bank reserves are pretty likely to be increased, at the start, more than money in circulation outside the banks is

[26] Assuming, of course, that other conditions did not meanwhile so change as to make a new equilibrium the normal one.

[27] The notion that loan interest would be reduced because there would be more money to lend, comes from overlooking the fact that with higher prices correspondingly more must be borrowed. See Fisher, *The Rate of Interest*, New York (Macmillan), 1907, p. 8.

increased. The case is substantially similar when gold flows into any one country from abroad. During two years of the present world war, while the United States was neutral, a tremendous excess of exports from, over imports to, the United States brought a very large inflow of gold. But the exporters did not want the balances due them in the form of gold or money. They desired some money but mostly checking accounts. They sold to the banks their drafts on the foreign purchasers of American goods, and accepted credit accounts with the banks and such cash for small transactions as they needed. The banks received the imported gold. The ratio of money in banks to money in circulation was large; the ratio of bank reserves to bank deposits (checking accounts) was larger than would otherwise probably have been the case. There were said to be surplus bank reserves.

Of course this condition is not permanent. The larger reserves must eventually mean more bank credit, i. e. a larger volume of checking accounts. The larger volume of bank credit must mean larger cash withdrawals. As we have just seen, the eventual new condition of equilibrium is one of increased money in circulation, proportionately increased bank reserves, proportionately increased bank credit, and higher prices. But how does all this come about? Must it not be through a bank discount (interest) rate sufficiently favorable to encourage borrowing? The banks have excess reserves and, therefore, large lending power. It is their particular business to make loans, and it is more profitable for them to loan at fairly low

rates than for them to hold excessive idle reserves. Gradually the favorable rate on loans encourages borrowing, bank credit expands, prices rise and, when bank reserves are no longer in excess, bank discount (interest) rates rise also. So, too, bank discount (interest) fluctuates with the change from business depression to business activity as bank reserves are alternately excessive and barely adequate. The ultimate long run influences on the rate of interest are those we have discussed in the previous chapter and the preceding sections of this chapter.[28] But the *fluctuations* in the loan rate are closely connected with the fluctuations in general business activity, seasonal changes, changes in the quantity of money and, going along with these or because of these, *changes in the per cent of bank reserves to bank deposits (checking accounts)*.

An increased quantity of money in bank reserves may not for several months or, perhaps, even years, bring about the eventual corresponding increase in bank credit and the incident rise of prices. The borrowing business man has, ordinarily, a certain notion of how much business he wishes to do and how large a stock of goods or how much

[28] To which should be added, the influence of the sporadic waiting made available by the institution of commercial banking, which places at the disposal of borrowers funds of depositors which would otherwise be idle for various indeterminate periods and tends thus somewhat to reduce the marginal productivity of waiting. More capital of other sorts can be produced because credit has been substituted for the more expensive specie. But marginal productivity remains a determining force in fixing interest. See the author's *Principles of Commerce*, New York (Macmillan), 1916, Part I, Chapter II, §§ 3, 4 and 5.

labor he wants to buy. To carry out his plans he needs a certain amount of funds larger or smaller according to the prices of what he has to buy. Until bank credit has expanded proportionately to the increase of money, prices will not rise in the degree to be eventually expected. But until prices do so rise, the business-man borrower does not need to seek much more than his ordinary credit to carry on his ordinary business. The level of prices depends largely upon the volume of bank credit but the amount of bank credit depends in considerable measure upon the level of prices. Nevertheless we are not absolutely caught in an endless circle. Favorable discount rates will encourage business men to borrow and endeavor to expand their business. But when the industrial world is fully occupied, the endeavor of its different units to expand can hardly result in a general expansion. Different business men bid against each other for labor, for raw materials, for structural goods, and prices rise. The rise of prices necessitates more borrowing, even if, in individual cases, there is no expansion. The favorable discount rates still encourage to attempted expansion and to the further borrowing which such expansion implies. At length per cent reserves are reduced, credit is expanded to its normal ratio to reserves and to money in circulation, prices are high, and men must borrow largely to do an ordinary business at these high prices. Interest rises, and, if bank reserves become inadequate or nearly so, may have to rise to a point as much above its usual level as it previously was below. We may, however, think of these various changes in bank discount rates as fluctuations above

and below an average or normal rate. Furthermore, the bank discount rate is purely a *loan* rate. It is not necessarily the rate at which present goods and future exchange for each other when capital instruments are sold. It is not necessarily, in other words, the same as the rate of return realized by the owners of capital,[29] although it tends, in the long run, to approximate that rate. When loan interest is, for any such special reason as increased bank reserves, temporarily abnormally low, this does not mean that the interest earned by capital is low but only that borrowers are profiting at the expense of lenders, realizing large or moderate returns on the capital of others and paying low rates for the privilege.

§ 8

Rising and Falling Prices in Relation to Interest

To illustrate the relation of rising and falling prices to the interest problem, let us take the case of a man who, for $6,000, buys a house. If, as a consequence of increasing gold production or expansion of credit or both, prices rise, in five years, by 50 per cent, and if this rise is a general one applying to houses as well as to other things, then his house, at the end of five years, will be worth $9,000.[30] The owner will have had the annual use of the house, or its annual rent at a progressively higher rate, and can now sell it for an increase of 50 per cent over the purchase price. Nevertheless,

[29] In excess of their wages of management.

[30] Making no allowance for depreciation.

on the supposition that other prices have gone up in like ratio he is no better off than before. He has 50 per cent more money than he otherwise would but also the things he wants to buy cost 50 per cent more. Similarly, if prices fell, so that his house would sell for only 2/3 of the purchase price, or $4,000, this fall would carry with it no loss, since the $4,000 would buy as much at the lower prices as the $6,000 would originally buy.

But with prices rising the annual *money* rents received for the use of the house, if rented, would come to be a larger *per cent* of its *original cost;* while with prices falling they would become a smaller per cent. The actual gain on investment may be the same in either case, but the gain measured in money bears in one case a larger and in the other case a smaller ratio to the original money value of the property. Hence, in a *nominal* sense, the interest received by the directing owner of capital is higher in periods of rising prices and lower in periods of falling prices. It should be emphasized that the interest here in question is the "implicit"[81] interest received by investors who directly purchase income-yielding capital; "explicit" or loan interest is not meant.

A consideration of the rate of interest on loans in a period of rising or one of falling prices, raises the question of the relative gain or loss from price changes of the borrower and the lender. Let us turn again to the hypothesis of a 50 per cent rise of prices and its effect on the purchaser of a $6,000 house; but let us now assume that $4,000 was bor-

[81] A term used by Fisher, *The Rate of Interest,* pp. 10 and 11.

rowed at (say) 6 per cent interest, the principal to be repaid in five years. In the meanwhile the lender receives $240 a year (6 per cent of $4,000), which the borrower can presumably pay, while still making something for himself, out of the gradually rising rent of the house. And at the end of the five years, when the property sells for $9,000, the titular owner has to pay only $4,000 to the person who made the loan, $4,000 which will buy much less than it would have bought when lent five years before. The titular owner himself keeps the other $5,000, a sum which makes good his personal investment of $2,000, together with the loss from the depreciation of money, and, in addition, gives him a substantial profit at the expense of the lender. Had the lender been familiar with the fact that money is not constant in value, had he foreseen the rise of prices, and, having the alternative of himself investing his money in a house or otherwise, had he refused to lend except for an interest return enough above the 6 per cent to compensate him for the depreciated value of the money he would later receive, the borrower would not have been able thus to gain at his expense. Indeed, as Professor Fisher has shown,[32] there is some tendency for rising prices, if long continued, to increase the rate of interest paid on loans, because, although the depreciation of money may not be consciously recognized as such, yet the profits of extending investment on borrowed money during such a period of rising prices are so tempting as appreciably to increase the demand for loans and,

[32] *The Rate of Interest*, Chapter XIV.

probably, to decrease the supply. More persons wish to borrow in order to invest. Fewer persons wish to lend for the investment of others. There is likely to be, therefore, when the rise of prices is at all prolonged, a marked tendency for loan interest to go up.

The statement that rising prices, if long enough continued, cause the rate of loan interest measured in money to rise, should not be regarded as inconsistent with the view previously presented[33] that a large and rapid increase in the amount of money is likely, at first, to reduce the bank rates of discount by creating large reserves. The *higher* rate of interest on loans should be regarded as a later effect of increasing money. The probable sequence would be: increase of money; increase of bank reserves; low discount rates on loans from commercial banks;[34] expansion of bank credit; rising prices; rising interest and discount rates.

On the other hand a fall of prices such that in five years the house and lot of our illustration would sell for only $4,000 instead of the $6,000 originally paid for it would mean, not only that the lender would get his $240 a year regardless of the fact that the rent of the house was progressively declining, but also that at the end of the five years the house and lot would sell for barely enough to pay him his principal. His $4,000, however, would buy very considerably more than the $4,000 he lent, while the borrower's $2,000 margin would be reduced to nothing. Falling prices, therefore,

[33] § 7 of this Chapter (V).

[34] Influencing, of course, the general rate of interest on loans.

call for and, in the long run, probably bring, lower rates of money interest[35] to compensate for the greater difficulty of repaying the principal. But changes in the value of money are inadequately realized and seldom accurately foreseen, and it therefore follows that the relations between borrowers and lenders are seriously disturbed by such changes. A money and credit system so adjusted to trade as to keep the average price level always constant would for this as well as for other reasons have advantages over the present fluctuating currency.[36]

§ 9

Some Further Complications in the Actual Industrial World

A number of additional refinements must be added to the theory of interest as thus far presented, in order to make this theory fit the complications of actual life. In the first place, we can not properly assume for the real economic world, as we have been assuming, for the sake of simplicity, in much of the preceding discussion, that the mar-

[35] It is not improbable that a decrease in the amount of money or a decrease of money in proportion to business, would first show itself in comparative insufficiency of bank reserves and temporarily higher discount rates, this condition being followed by a decrease or relative decrease of bank credit and by falling prices, and the falling prices leading to a decrease of demand for loans and, hence, to a lower rate of interest on money.

[36] See *The Purchasing Power of Money*, by Irving Fisher, assisted by Harry G. Brown, New York (Macmillan), 1913, Chapter XIII, for a discussion of various methods of making the price level more stable.

ginal gain from roundabout production will be alike 10 per cent or 5 per cent or any per cent for all actual and potential producers, without regard to whether they have access to the loan market. Capabilities and aptitudes differ. Marginal roundabout production might yield, for one man, making use only of his own saving or waiting, 10 per cent over the yield of direct production; while for another man, making use of all his own waiting and no more, the yield might be only 4 per cent. The yield to the second man might be smaller because he had saved more and had to carry roundabout production to a lower margin. Or it might be smaller because he was less efficient in roundabout production or because he was more efficient in direct production. In any such case both would gain by the possibility of a loan. If both have saved equally while the first producer can gain a larger per cent from roundabout production, the first can profitably borrow and the second can profitably lend. So, likewise, if the second has saved so much that his waiting, directed by himself, can produce, at the margin, but little return, it will be advantageous to him to lend to someone who can make his waiting produce more. In that case he will not carry his own use of capital to such a point as to bring the marginal yield below the interest he can realize by lending. The first producer, whether the large gain he can realize from roundabout production is due to his having saved little or to his being relatively proficient in directing a roundabout process, will find it worth while to borrow at the prevailing rate and to carry roundabout production to a point such that the yield

from its further extension under his direction would not be in excess of the rate at which he could borrow. Thus, the marginal productivity of capital or of waiting, for each producer who directs the use of capital, tends to approximate the rate of interest at which he can lend or the rate at which he can borrow. If everyone could give equally good security and could, therefore, borrow at the same rate, the marginal productivity of waiting would tend to be the same for all producers and all lines of production.

In the second place, we must somewhat qualify our conclusions regarding the determination of the value of capital, though not in such a way as to affect the main principles contended for. We have said that interest is some per cent, e. g. 6 per cent, because capital instruments the values of which are measured by the alternative goods that could be produced by the same labor, working with an equivalent equipment of land and tools, yield 6 per cent. Thus a railroad, some barns, some mills and some machinery, taken all together, would be said to be worth in the long run a certain amount in terms of consumable goods or of money exchangeable for such goods, because, were they to be worth any less, the labor, etc., turned to their construction would find it more profitable to turn, in part, to the production of consumable goods. In the real economic world, with the diverse inherited abilities of its members and the different kinds and degrees of acquired skill, many producers practically have not the alternative of changing employments. But so many can change their employments and the choices

of those persons just about to enter the ranks of industry are so important, that the value of various kinds of capital is related, through their alternatives, to the value of consumable goods. In like manner the value of consumable goods is related to the value of capital. Since producers of one kind of goods usually have different aptitudes than producers of another kind, we cannot say that the value of any capital must exactly equal the value of the present goods which the same labor or an identical quantity of labor would produce. But that there is a close relation between the two, due to the existence, for many producers, of alternatives, cannot be gainsaid. Stating the matter roughly and assuming the above qualification to be made, we may say that the (marginal[37]) product of labor devoted to the construction of capital equipment will exchange for the (marginal) product of an equal amount of labor devoted to the production of consumable goods.[38] Of course,

[37] For explanation and more complete discussion of the "marginal" product of labor, see Chapter VII.

[38] If A buys from B a piece of capital which it requires (say) a year to make, the price paid for the capital will of course be different according as the payment is made from day to day to support B while he is making it (wages) or at the end of the year when it is complete. In the former case A would be willing to pay the amount of current goods which labor equivalent to that of producing the capital could alternatively produce. In the latter case, if A had *contracted at the beginning of the year* to buy the capital of B at the end of the year, the amount he would have been willing to offer would be, not the amount of goods he could have currently produced by a direct process but the amount he could have produced by the most effective roundabout process available which would nevertheless yield its entire product by the end of the year. But if A does

also, if capital of any special kind is constructed in such excess as to make its surplus marginal productivity less than that of capital in general, its salable value will come to be less, while it is thus in excess, than its cost of production. But the tendency will be for the construction of such capital to cease until its value again reaches its cost.

It is understood that the labor devoted to producing consumable goods uses existing equipment and that, if it did not have any such equipment its marginal product might be very much less. Likewise the labor devoted to making equipment uses preexisting equipment in so doing. It is, indeed, clear that, in general, industry is immensely more productive with capital than it could possibly be if there were no capital. The marginal products of the other factors are greater the larger are the accumulations of capital of which these other factors can make advantageous use, while the marginal productivity of waiting is diminished

not decide to buy the capital until the end of the year he makes his decision when there is no longer open to him the alternative of himself producing it *and enjoying its use equally early*. Nevertheless, the opportunity to make choices among all the options here suggested continually recurs and is of importance in the determination of capital value. There is also the option, for A, of combining his effort with that of others so as to produce the capital in less than a year. In that case it is only partly his but also he has only paid part of its cost. The possible options significant for the interest problem include, of course, not only the choice between direct and roundabout production but also, as suggested above in this note, choices between longer and shorter roundabout processes. These choices, too, are choices between larger and smaller later incomes as much as they are choices between earlier and later incomes.

and the rate of interest lowered. That capital should be accumulated is important, therefore, even to those persons who cannot themselves save any. Likewise, in a community which has large accumulations of capital and in which, consequently, the productivity and price of other factors is high, the individual business man cannot afford not to use capital. Were an employer of labor to use no capital at all in his business, the product turned out by his employees would seldom or never pay their wages. Nor would this product probably pay the rent charged by the owner of the site used. The difference between using and not using capital might therefore be the difference between swift failure and measurable success. But the difference between using a little more or a little less capital would be of comparative unimportance and might be a difference of only 10 or 5 per cent of the additional increment used.[89] In modern production there is practically always more than one factor; usually there are three. Whatever may have been true of primitive man, modern man always uses tools. He uses tools to make tools and buildings to make the structural material for more buildings. The point here to be emphasized is that, in the case of a man who is marginal between the two employments, what his labor can add to the equipment of society which existing equipment cooperating with other labor would produce without him, will exchange for what his labor could add to the consumable goods or services available to

[89] Cf. Jevons, The Theory of Political Economy, fourth edition, London (Macmillan), 1911, pp. 256-259.

society, which existing equipment cooperating with other labor would produce without him. Since goods are produced by land, labor and capital acting in conjunction, and since this is as true in the production of more capital as in the production of consumable goods, we must broaden our statement if it is to make proper reference to land and capital as factors in the production of additional capital. Let us say, then, that the value of any capital will be equal to the amount of consumable goods which the labor *and* the land *and* the capital used in producing the additional capital in question could produce,[40] assuming each of these factors to be used in its most profitable alternative way. And the fact that capital of a certain value determined as has been herein set forth will yield a given income, is a reason why interest on loans is a given per cent.

In the third place, attention should be called to the fact that, in a modern community, to a considerable percentage of business men, investment and, therefore, capitalistic or roundabout production does not involve primarily manufacturing but has to do rather with merchandising. Hence roundabout production may, for them, involve other investment outlays in addition to those for the provision of such *material* equipment as stores, delivery trucks, etc. These other outlays of the merchant—and of the manufacturer in so far as he must devote a part of his attention to the mere selling of his goods at a profit, as

[40] The labor, land and capital here considered are assumed to be, each, not specialized but marginal between two uses.

distinguished from the manufacture of them—include, for example, outlays for the building up of goodwill, among which advertising is perhaps the most important. Competitive advertising may, indeed, be a waste of a community's labor time. The argument currently advanced that it enables a merchant or manufacturer to sell more cheaply because of the increased volume of his business may be applicable in the case of any *one* merchant or manufacturer who advertises, as contrasted with the prices he would have to charge if *he* did not advertise. But when the advertising is done by all sellers in any line the result may well be that, on the average, their business is no larger while the expense of doing it is greater, so that the charges for the goods sold must be higher. Even if each of the sellers of these goods, by virtue of advertising, sells more than before, the increased purchases by the public in this line, thus stimulated by advertising, inevitably mean less purchased in other lines. It is difficult to see, therefore, how competitive advertising, except so far as it may be a necessary means of developing intelligent discrimination among purchasers and so somewhat stimulating rivalry among producers, can be anything but wasted effort. The time may come when, for its own protection against increasing costs of distributing products, the public will establish and enforce a maximum limit to advertising, will fix, as it were, a plane of competition in advertising, just as it endeavors to fix a plane of competition as regards employment of child labor, price discrimination, railroad rebates, etc. However this may be, advertising is an investment

which, for the individual concern which engages in it, is often well worth while. For such a concern it is productive. And for such a concern the building up of goodwill in this way, from which profitable results are expected in the future rather than at once, is clearly a case of roundabout production. It might well be financially advantageous to borrow the funds for the purpose and pay interest on them. The labor and other factors employed in advertising are employed analogously to the labor and other factors used in constructing material equipment. The purpose is, not to change the form of wood, iron, etc., as in the latter type of operation, but to change the mental processes of potential purchasers of certain goods. The labor devoted to doing this does not directly and immediately produce its own food and clothing or, even, the sales which bring money income (exchangeable for food and clothing) to the employing firm. To keep this labor thus employed in a roundabout process which yields a greater but a less early return than direct activity would yield, current means of livelihood must be provided to those so employed. The persons who furnish newspaper plant and other equipment for the purpose must also receive payment in the form of purchasing power exchangeable for a certain amount of subsistence.[41]

[41] In this connection it may be well to point out that the expenditures of a government for war purposes are, in a sense, expenditures for roundabout production. The army of a dynastic or imperialistic state is maintained as a means to the realization of dynastic or imperialistic aims. A democratic nation may wage war for the perpetuation of democratic institutions. In either case, the food,

As always, of course, when wages and other payments are made in money, the persons receiving these payments may, if they choose, spend the sums received for *capital.* But if they do they are receiving *future* goods for future rather than present goods for future and the rate at which present goods exchange for future has in the circumstances, no particular significance. In passing, mention may be made of the fact that subsistence, etc., used to make possible leisure from direct production and the devoting of time to securing general education or technical training may be said, often, with truth, to be used for roundabout production.

§ 10

Interest Earned and Unearned

Roundabout production may and often does involve exploitation. Thus, a manufacturing concern the dividends of which will be enhanced if it can, in future, be assured of freedom from com-

clothing and munitions furnished the soldiers make it possible for them to devote themselves to ends more or less remote but, in the view of their government, ultimately desirable ends, as distinct from devoting themselves to the immediate production of consumable goods. But, of course, the providing of millions of soldiers with goods which are immediately consumed and destroyed makes it impossible to provide so many producers with the means requisite to carry on roundabout *industrial* processes, tends to raise the surplus marginal product of roundabout production and tends towards higher interest rates. Means of defense are necessary and clearly justifiable for a nation surrounded by armed potential foes; yet it is also clear that from the point of view of *world* economy, competitive military and naval establishments are not instruments of production but merely very heavy burdens.

petition with foreign rivals, will be, from the point of view of its stockholders, engaged in roundabout production when it pays for advertising space in newspapers to create a general sentiment in favor of the tariff as a wage-raising device, contributes openly or by indirection to a political campaign fund, and hires lobbyists to care for the particular schedules in which it is interested. All of the labor and other factors so employed must be paid what the market conditions require and therefore must be paid not less than they could secure in direct production. The activities of these factors are expected to yield larger eventual returns to the employing company than if they were used in selling or in producing immediately salable goods. Did the company borrow to carry out such a policy, the borrowing clearly would not be the result of a desire upon the part of the company's stockholders to secure present consumable goods for their own consumption but because the control of present consumable goods (or the funds to purchase them) enables the company to employ in a relatively long-time process labor and other factors which might else have been employed in more direct production,[42] and to reap a gain in so doing. The company's demand for funds has resulted, not from preference for present goods over future but from preference for a larger future income over a smaller future income. Clearly, the gain from roundabout production is not necessarily a social

[42] Or in roundabout production for some other employing company, thus displacing another set of employees and equipment for more direct production.

gain. Exploitation of the masses by a plutocracy may be, in part, exploitation by a roundabout process. Income so secured is not earned by service rendered, although, of course, the owners of the funds used receive their interest return for rendering a service to those who are rendering the public a disservice. Income derived from the use in serving the public, of funds accumulated by the saving of gains themselves legitimate, is earned. Income secured by injuring or assisting in injuring the public should be terminated so far as is reasonably possible, by effectively prohibiting exploitive activities.

It should now be clear that, if all possible anti-social uses of capital were effectively forbidden, interest on capital would be earned as truly as, under like circumstances, the wages of labor would be earned. The person who had accumulated capital, who had, by his saving, brought into existence capital which, except for him, would never have come into existence, and who thereby had made possible an addition to the current product of industry, would have earned, in the sense of giving a *quid pro quo,* interest on this capital. Such interest, contrary to the view of Marxian socialists who include all interest in what they call "surplus value" is in no sense exploitation. There is, indeed, far too much exploitation in the modern industrial world. The nature of some of this exploitation has already been explained in this and the previous chapter and attention will, as we proceed, be devoted to exploitation of other kinds. But that interest, purely as such, is necessarily exploitation, is a claim

which neither the socialists nor anyone else can substantiate.[48]

§ 11

Summary

The interest rate in a modern community is a result of the influence of many alternatives of many individuals. A person may lend or borrow, he may buy capital with consumable goods or sell capital for consumable goods, he may engage in relatively roundabout or relatively direct production. The rate at which present goods exchange for future goods outside of loan contracts, is a part of the same problem. The value of

[48] Nor do owners of capital *as such,* have any advantage over the rest of the community in the ability to profit beyond their own contributions by the accumulated technological knowledge of the race. (That they do have this advantage seems to be asserted by Professor Thorstein Veblen in *The Instinct of Workmanship,* New York,—Macmillan—, 1914, p. 281.) In this regard, not they alone but all of us of the present generation, reap where we have never sown. Labor or land, as well as capital, may thus be rendered more productive than in the past. But in truth, *if the capital from which any person derives interest was itself fairly earned and is used in socially desirable ways,* its use adds to the productiveness of industry, over and above what all the land, labor and other capital of the community could, *in the prevailing state of technological information,* have produced without it, all that its owner receives as interest. His gain leaves to the rest of the community all that the intellectual equipment of the race could have produced without his accumulation. He reaps only the *additional* value output which would not have resulted except for him. And in proportion as large amounts of capital have been accumulated and its marginal productivity and interest so reduced, the tendency is for others than the owners of capital to profit greatly from industrial progress and from capital construction.

capital is influenced by the rate of impatience or time preference at which its expected future benefits are discounted but also by the fact that the labor, etc., devoted to the production of this capital might have been devoted, instead, to the production of other and more immediately consumable goods. In a broad sense the owner and user of capital, no less than its owner and lender, enjoys interest. We may, with some gain in clearness, regard the surplus of roundabout over direct production, at the point beyond which roundabout production is not extended, as the marginal product of abstinence or waiting, since it is abstinence or waiting that makes this gain possible and since capital is not an ultimate factor. The gain is less the farther abstinence or waiting is carried. But the rate of interest tends to equal the per cent of this gain. A rate of interest higher than the marginal product of waiting must cause the demand for waiting by those who would purchase it (offering future goods for present) to be less than the supply offered by those who would sell it. Likewise a rate of interest lower than the marginal product of waiting must cause the demand for waiting to be in excess of the supply. Only at a rate of interest equalling the marginal product of waiting can we expect the demand for and the supply of waiting to be equalized. Such a rate will, of course, be higher than the marginal yield which some men could secure from their waiting did they insist on making use of all of it in business directed by themselves. These men will usually prefer to be lenders. The equalizing rate will be

lower than the marginal product which other men could secure if they used their own waiting alone. These other men will usually be borrowers. Thus, the waiting done by men in excess of their own profitable use may be made advantageous both to themselves and to others. The rate of interest clears the market in exchange of present for future goods, equalizes or tends to equalize the time-preference or impatience rates of those who have access to the market, equalizes or tends to equalize the marginal productivity of waiting for different persons who have occasion to make use of waiting and who are able, through the market, to buy and sell it at approximately equal rates, and, also, equalizes or tends to equalize the marginal productivity of waiting for different lines of production. Roundabout production need not involve material equipment but is exemplified in advertising, lobbying, and other non-technological activities. Roundabout production may be "production" only in the sense of exploiting the public for the benefit of a few, in which case the interest received can hardly be regarded as earned by equivalent service given. Fluctuating bank reserves and rising and falling prices are likely to cause fluctuations in *loan* interest but do not necessarily affect the real incomes received by owners of capital who themselves direct its use. It is the real incomes from capital which, in the long run, tend to fix the rate of interest on loans.