Professor Hayek and the Theory of Investment

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Source: *The Economic Journal*, Mar., 1935, Vol. 45, No. 177 (Mar., 1935), pp. 77-94

Published by: Oxford University Press on behalf of the Royal Economic Society

Stable URL: https://www.jstor.org/stable/2224581

PROFESSOR HAYEK AND THE THEORY OF INVESTMENT

In the remarks which follow, I am not concerned with the technical problems of the "structure of investment" actually discussed in Professor Hayek's recent article,[1] and shall take no notice of what may be right or wrong in that connection. I am concerned rather with the fact that the article pretends to do something far more fundamental, but which, as I think, cannot be done. The author asserts (page 208, note 2) that his paper contains implicitly the answers to objections recently made to the Austrian theory of capital, and names among other references a paper of mine published in the volume of *Economic Essays in Honour of Gustav Cassel*. In this connection, he asserts or assumes, on the average of at least once to a page, that he has proved, or is proving, or that it is self-evident and requires no proof, that a change in the amount of capital in society is identical with a change in the "investment structure," an increase corresponding to a lengthening, and a decrease to a shortening, of that structure (cf. p. 211, especially footnote 2; p. 231, etc.). And increase of investment is further identified, if not quite so clearly and emphatically, with a lengthening of the production process or production period, the interval between the time when "labour" is performed and the time when its product is consumed (*e.g.* pp. 208, 209, 223).

If, however, this theory, or either part of it, is anywhere argued, or any reason given for believing it, I have not been able to locate the passage in question. Indeed, on page 225, just preceding another assertion of the point at issue, there is a statement which is very nearly a direct "give-away." It reads: "More goods (or, where possible, more durable goods) of the kind will be produced. . . ." It should be apparent that as regards a relation between capital quantity and investment structure the essential issue lies in the difference between constructing more goods and constructing more durable goods (in response to a fall in the interest rate); also that Professor Hayek is bound to maintain (*a*) that the sole effect would be the substitution of more

[1] "The Relationship between Investment and Output," Economic Journal, June, 1934.

durable for less durable goods (not that this is a contingent possibility, as indicated by the parenthesis); and (*b*) that this change lengthens the interval between production and consumption.

If the question were considered at all, it would surely be immediately evident that in neither of the two senses discussed by Professor Hayek does the investment of more capital necessarily involve, still less is it equivalent to, a lengthening of the time structure of investment—and *still* less to a lengthening of the production process. Moreover, there is no production process of determinate length, other than zero, or "all history." New investment may or may not involve either (*a*) an increase in the average durability of the goods involved in economic activity, or (*b*) an increase in the average construction period for such goods. It is to be assumed that, other things being equal, an increase in investment would involve both an increase in the amount of goods of the same kind and the construction of new kinds (see quotation above from Hayek, p. 225) according to what happened to be most *profitable*. "Possibility" is not in question, as generally in economic matters. More goods of the same kind would mean no permanent change in either investment function or output function, as defined by Professor Hayek, and new kinds would mean changes in both directions nearly at random, as regards both period of construction and durability.

It is true that there is a partial, *temporary* exception, in connection with an expansion of production not associated with any change in the composition of the product or in technology. If such an expansion takes place in perfectly rational order, there will be, *temporarily* (while the expansion is taking place, but not after it is completed), a slight increase in the proportion of goods in the earlier stages of processing operations, in comparison with later stages. It is to be noted, too, that there is little rigour in the complementary relationships between goods representing different stages of a given process, that *inventories* play a large *and flexible* rôle at every stage.

There is also a presumption, though no necessity, that both the average construction period and the average durability of wealth items will increase somewhat, though in no determinate degree, with an increase in the proportions of wealth to (labour and to) total income in a society. The reason is that, on the one hand, increased durability is *one way* of investing more capital and securing more income (because the annual deduction from gross yield for depreciation is reduced); and, on the other hand, interest during construction is one element in cost, and would probably

increase along with other costs; and especially, a reduction in the cost per unit of time, through a lower interest rate, might well lead to an increase in the time. In both cases the particular element of time is one among a practically infinite number of variables, and the relative importance of the effects in question in the total of effects will be measured by a corresponding fraction. It is presumed, too, that any increased use of capital will find its expression in part in the making of altogether new products, and the time relations in this connection are entirely unpredictable.

For the general theory of capital, and for appraising Professor Hayek's claim mentioned above that he has met the objections to his theory, to which he makes reference (notably those of the present writer), the question is whether increasing the amount of capital invested lengthens the production process, rather than what is its effect on the investment structure. This general theory of capital is, of course, that promulgated by Böhm-Bawerk and his followers and generally accepted and taught in the past generation.

On the face of it, there must be plausible reasons for holding that the use of more capital is equivalent to the use of more time in production; otherwise the doctrine would not have been so generally expounded and believed. It unquestionably requires time to construct capital goods, and since these are subsequently used in processes requiring time, to make a product, and are more or less typically used up, it is natural to consider their production and use as an indirect in place of a direct application of the productive capacity going into them, and to consider the time involved in their creation, during which no final product is forthcoming, as added to that of their use to form a total production period for the final product. Reasonableness is harder to discover in the doctrine that labour produces capital in any sense not just as valid reciprocally, but this also is generally accepted by many of the best economists.

A brief statement of the reasoning which shows this entire procedure to be false may start from the personal statement that I myself completely accepted it for years, taught it in class lectures and expounded it in text materials manifolded for student reading, and of course it was never questioned by the "innocents" who were the victims.[1] Realisation that the whole argument is

[1] The theory of profit developed in my book on Risk and Uncertainty rests upon the general view of the entrepreneur or business unit buying productive services "now" and selling the products in the future, and the theory needs to be entirely reworked. Profit must be computed with respect to some definable

fundamentally wrong came through working over the meaning of the wage-fund theory, particularly as expounded by Smith, in relation to Böhm-Bawerk's defence in the last few pages of the *Positive Theory* against the self-accusation of being a wage-fund theorist. Let us glance at this original form of the theory.

Here, neglecting "land," it was argued that the capital produced in one year, thought of as food and other provisions for the use of labourers, supports the same amount of labour the next year, while the original capital is being reproduced. There is here, in the first place, a real and definite "cycle." Moreover, if in such an agricultural situation some crops are biennial or require several years to produce, their value will be increased accordingly by accumulated interest. And it is evident that if plants requiring more years to mature are to be substituted for others growing in a shorter period, a greater accumulation of the final product will be necessary to initiate and to support the operations (two different matters !), and the yield of the more slowly maturing crop will have to be greater to induce men to make the change of introducing it. This is undoubtedly the logic of the Böhm-Bawerk theory, which further assumes that the construction and using up of auxiliary instruments such as tools and machinery is equivalent in principle to the alternate production and consumption of supplies for the use of labourers. But such a production period explanation of capital is reasonably sound only with reference to assumptions which are almost entirely false

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basis, either a dated interval of time, or a particular item of product, or to a project or venture somehow defined. It is, of course, the first of these which is actually and in general necessarily adopted. In any case, the essentials work out in the same way. The *crucial* element in the profit problem in a society in which capital is employed has to do with asset values. It is a question of (expenditures and receipts and of) the relative value of assets at the beginning and the end of the accounting period. For any basis other than a time interval, the elements will be (direct charges and credits to a particular account, together with) any and all effects upon asset values which can be attributed to the project or entity with which the account in question is kept.

The main point for emphasis is that the outlays and returns compared to determine profit are not separated by any time interval, but belong to the same accounting period, however short it may be. For any outlay in business or production the corresponding return is not in the future, but contemporary. Time and uncertainty enter into profit in a different way altogether—namely, through the capital account, or specifically, through inventories and depreciation. But capital itself is always a matter of anticipation to the infinite future. Of course the concrete anticipation may relate to capital value at a future date rather than to perpetual income, and the capital may at various times and to a greater or less extent assume for the individual owner the particular form of money; but neither fact affects its character of a perpetual anticipation. This comes to be limited only if business in the entire system is conducted on the anticipation of a universal disinvestment.

to the facts of modern industrial life, and cases which it reasonably fits are obviously special cases under other principles having general validity.

Even with reference to such primitive agricultural conditions the really critical student (such as hardly exists) might have had disturbing queries in connection with treating quantity of capital as a matter of length of production cycle. In fact, the quantity of the capital bears no simple or definite relation either to its durability or to any definable time interval. Taking population as given, raising *more* plants of the *same* growth period will also require more " stock," but *will not* affect the length of the cycle, while the *addition* to total production of new varieties of *shorter* growth, say yielding two harvests per year instead of one, will involve an increase in the capital, while *shortening* the average cycle. It will, moreover, require time to make the change in all these cases, but additional capital is involved in very different ways for lengthening the cycle and for increasing production without this lengthening, and the transitional relations are different from those of the new routine when established. In the third case, which is intrinsically as probable as the other two, production may be maintained with a shortened cycle, and capital released or production increased and the same amount of capital used. The fact that time is required for changing from any system to any other is confused with change in the length of the cycle itself, is one of the basic fallacies of the modern theory. It will be noted, too, that the service life of capital goods in the form of an annual crop of supplies for the support of labourers is not due to any intrinsic quality, but simply to the production period for a new crop. The amount of supplies which last one year is highly variable with the seasons, and will change (for a given population) with any change in productive efficiency and living standards (leaving the cycle unaffected).

The crux of the wage fund situation is first that the capital, while constant in amount, passes by investment and disinvestment through a real and regular physical cycle; and second, that it could be said to be produced by labour, if capital constituted support for labour at a fixed level (as the classical economists always really assumed),[1] or if, at least, variation in the level of

[1] This involves rejection of the wage-fund doctrine as a theory of *wages*. The wage theory of the classical system was an " absolute " standard of living theory. Its basis was the assumption that the employer (miscalled capitalist) gives the labourer some fixed amount (not fraction) of the product, which is necessary to enable him to live and work, or perhaps a merely conventional payment, in any case one determined in some absolute manner, unrelated to competitive bidding

support or standard of living for labour were not associated with any variation in the output of the combination. In fact, however, labour is also produced as well as "maintained" by capital (if there is any difference), and there is no real priority either way, even if we go back to the historical beginning of economic life.

It is only under the arbitrary and absurd assumption that capital is eaten up at a fixed rate (such as the fixed scale of support for labour) that there is any correspondence between a quantity of capital and the length of a productive cycle. Under competitive conditions, where alone quantity of capital is at all definite, the quantity is the capitalised perpetual net income of any capital good (after full maintenance, including replacements) and is *also* its cost [1] of production, which includes a capital charge. Thus both these magnitudes involve a rate of return, which is "determined" by their equality. In determining both construction cost and service life, time is one factor or dimension among a practically infinite number, and quantity of capital may and does vary quite independently of either of these time intervals. *Caeteris paribus*, it of course increases with either, according to the compound interest formula.

It is if possible even more fatal to a production period theory of capital that no such period can be defined under modern conditions, either before, or after, or during an increased application of capital. The sum of the construction period and service life averaged for individual capital instruments is neither determinate in itself nor significant for theory. Even in 1776, provisions for

among purchasers of labour, and hence unrelated to product value. Only in such a way could a residual theory of the capital share be given foundation. The "system," then, was this: First, land gets its differential or residual product. If this is stated so as to make any sense at all, it means a marginal-productivity theory for labour-plus-capital, and the residuum is easily seen to be identical with the marginal product of the land itself. Second, labour gets what it "has to have." And third, capital gets the final residuum. And this nonsense passed for an economic theory of distribution for a century, until Jevons and Menger demoralised it without seeing much as to how a real distribution theory was to be built. This achievement had to wait at least two more decades, or until Wieser, Hobson, J. B. Clark, and especially Wicksteed, gropingly indicated the circularity and symmetry of the relations. If economists had known the rudiments of analysis as put in shape by Leibniz, Newton and others a generation before Adam Smith was born, the history could have been more pleasant to look back upon. But the only theory which makes sense at all is still rejected by a large fraction of the teachers of economics, as well as indignantly by labour leaders and reformers; and it is not in the least degree understood by either the men who manage business or those who make laws, most of whom still believe that labour alone is really productive.

[1] More generally, where conditions are not stationary, the estimated cost, discounted for uncertainty, of any new item yielding the same net perpetual income.

the support of labourers—reproduced by labour, or by labour and land or even labour, land and capital—annually or in any other definite period, was only a part of capital. And even for a strictly interpreted wage fund it is arbitrary to call any point in the cycle a beginning or an end; it is a hen-and-egg sequence. Under modern conditions there simply is no cycle. It cannot now escape observation that " capital " is an integrated, organic conception, and the notion that the investment in a particular instrument comes back periodically in the form of product, giving the owner freedom to choose whether he will re-invest or not, is largely a fiction and a delusion. To show this conclusively it should suffice to mention the case of a part of a machine. The part cannot be liquidated without liquidating the machine. And the machine as a unit is in a similar sense a " part " of an integrated productive organisation which is not bounded by the scope of " plant " or firm, but extends outward indefinitely to indeterminate limits. Moreover, the capital structure and every unit in it is typically planned to perpetuate itself, and not for liquidation.

The animus underlying Smith's theory of capital was plainly the downright fear that the owners of capital might eat it up without replacement. (And this is, if possible, even clearer in Mill.) There never were serious grounds for such a fear, though the difference and even opposition between the two interests, of maximising consumption and providing for the future, ought to be stressed. But under modern conditions the possibilities of liquidation without serious loss are very limited, and the possible scope and speed of liquidation are only remotely related to the normal durability of the physical thing (or other " condition ") in which any increment of capital is invested. In a stationary or progressive society, small increments are indeed liquidated from the standpoint of the individual owner (consumed); but no real liquidation from an aggregate viewpoint is typically involved in the process, and real liquidation, into consumption, is hardly in question. The individual owner desirous of consuming any increment of capital naturally sells out at full value (for future production, above maintenance including replacement) to some other owner, and the productive organisation is not affected. In connection with the business cycle, and the depression problem in particular, the liquidation which is at issue is almost entirely conversion into *money*, not into current consumption. Failure of physical maintenance sometimes results from the helplessness of owners, and is connected with the unexpected loss of earning power consequent upon economic disorganisation. This con-

fusion between real liquidation and pecuniary liquidation, or saleability—which is not liquidation at all—needs fuller consideration. By way of preparation, it is needful to pass in more systematic review some of the essential facts in the problem of capital.

1. The most important fact requiring clarification is the nature of capital *maintenance*. This topic is a detail under a general consideration which is the source of much confusion in economic analysis—namely, the necessity of a clear distinction between stationary conditions and growth (increased provision for want-satisfaction for a given population). In a society which is maintaining or increasing its capital (per capita), all production of capital goods axiomatically represents either replacement or growth. (The situation in a retrograde society would have to be considered separately, but involves little change in the reasoning.)

No rational analysis of economic process is possible without making a sharp distinction between the " production " of " plant "—meaning *new or additional* plant (and properly including both the material and the human elements) and production in the sense of using plant to produce output. Use of plant in the production of the output (of *services*) consumed in any time interval must include the maintenance of plant, and this may involve replacement of particular items of plant. Obviously, if the plant " used up " in any interval is not maintained, the consumption of that interval is to a corresponding degree not produced in the interval, but represents the eating up of resources existing at its beginning (a process of disinvestment). The least experience with, or knowledge of, accounting must certainly make this clear, but it should be self-evident without even that elementary preparation.

Obviously, too, " replacement " of any concrete item of plant is, as already suggested, an accidental, technical detail in maintenance. What we call an item of capital itself is largely arbitrary. If any item is replaced bit by bit, the operation is correctly seen to represent routine maintenance, and the distribution of replacement through time does not change its theoretical character. The only reason for ever taking notice of replacement is to effect uniform distribution of cost and return from the standpoint of a particular business unit. If the construction period is comparable to the service life, the technical activity itself is necessarily distributed. Many plant items last indefinitely without any maintenance expenditure distinguishable from the costs of

operation or use of the items in question; another large fraction lasts indefinitely under purely routine maintenance, such as oiling, painting, cleaning and the like; another large fraction is permanent except for replacement of particular parts, which may be an insignificant fraction of the entire item; a fourth fraction is replaced piecemeal, as already suggested, with no particular date of superannuation (and in reality this category includes all replacement of material things); finally, a very large fraction has no natural or physical limitation of life, but may or may not pass out of use through supersession, in connection with technical and other changes involved in social evolution. Analytically, not only is all reproduction of wealth items (capital goods) included in the category of maintenance, but maintenance itself is only for special reasons, if at all, to be distinguished from other forms of "operating expense" which represent the division of joint product with the other agencies, physical and human, co-operating in production with the item in question. An analytically correct designation for new investment or disinvestment, from the aggregate standpoint, would be over- and under-maintenance respectively.

The consumable output of any "plant" or other productive organisation in any time interval, however short, assuming full maintenance, *i.e.* no disinvestment, is produced in that interval. Production in the sense of utilisation of a given plant and consumption of the product are simultaneous, and the "period of production" of consumed output is zero. The time required to put any particular unit of material through any physical process has nothing to do with the case, since it is a part of the production of any portion of output to maintain the plant involved, in its original condition; and plant maintenance includes replacements. This applies alike to materials which render final services, or are said to be "consumed," to raw materials, and to "auxiliary" goods, machines, tools and the like, which contribute to any quantity of output and which the consumer never sees.[1]

[1] The basic fallacy of the Böhm-Bawerk theory of capital is a twofold one which has vitiated the entire theoretical system of classical economics. Production is viewed as production of wealth, and wealth is viewed as concrete things. In reality, what is produced, *and consumed*, is services. The production of any service includes the maintenance of things used in the process, and this includes *re*production of any which are used up. Apart from such reproduction, really a detail of maintenance, things are "produced" only when added to a total stock. (This was seen by Mill, to the confusion of his definition of production—*i.e.* of productive labour—which refused to include services. See *Principles*, Ashley edition, p. 49.) Moreover, the creation of an addition to wealth is production only in an accounting sense; for there is no corresponding consumption, either

On the other hand—in contrast with production as the correlate of consumption—the creation of any addition to plant is, at least "theoretically" (meaning in so far as correct accounting is possible), a process having a definite beginning and end, and hence occupying a definite time interval. The time required to produce the entire plant in use in any society at any time is simply its entire past history—or all history down to some antecedent date at which growth may have stopped. Regarding the social plant, however, some explanation is necessary as to the part to be *called* "capital," and the same explanation will make it clear that there can be no sound distinction between "primary" and "secondary" factors of production.

2. At any moment, or "as of" any particular date, and with reference to economic use and value, everything in existence which bears or represents productive capacity is without exception primary, *given*; viewed historically, all have been produced, in the economic process as a whole, extending down from the beginning of economic history. It is true that different items are in various degrees produced under "economic" conditions, *i.e.* by the use—in the case of creating new wealth, the investment—of existing resources on the basis of complete foreknowledge, and quantitative estimation in purely economic terms, of the results to accrue in the future from such investment. In "free" society, the human resources are presumably to a relatively minor extent produced under these conditions; and in the production of "property," including real estate, mineral workings, etc., rational foresight and the pecuniary motive control in varying degrees. It may be true that particular items are simply "found," without any planned economic expenditure; but such finding must be accidental, unanticipated, or the competitive struggle for the opportunity of finding will itself tend to involve an investment equal to value realised. (The moral significance or social pro-

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in the same interval or at any future time, as long as the wealth (in any physical form) is used to *produce* consumed services.

Secondly, wealth, which is identical with capital, can be treated quantitatively only by viewing it as capacity to render service. A service is measured by its economic value (equal to relative marginal utility) and wealth by *capitalised* service value. Capitalisation is most naturally and realistically conceived as involving the transformation of all service-income from wealth which is not intrinsically permanent to a perpetuity basis by "depreciation." The quantity of wealth, or capital, in any item is the value of its net perpetual income, whether the life of the concrete item is zero or infinite or anything between. (Regarding the rate of capitalisation, see above, p. 82; also, the article "Interest" in the *Encyclopedia of the Social Sciences*, and an article in *Economica* for August 1934, referred to at the end of the present paper.)

ductivity of the investment is a separate issue.) The relation in production between various types of agencies is one of strictly mutual complementarity.

3. In "free" society, the creation of productive capacity in the form of human beings or human qualities is not *called* "investment," and the result is not *called* "capital." This usage is scientifically correct, because in free society human beings—the "things" bearing or embodying productive capacity in the form of "labour"—cannot be actually bought and sold, or their services mortgaged, or made the subject of an enforceable contract for a long period, and hence no definite money value can be placed upon them. They are not quantified and are not "wealth." The human being has no economic value to anyone but himself, and he has no reason for keeping a capital account with himself, even if it were possible to do so with any degree of accuracy. In connection with human beings, it is therefore impossible to distinguish among the three forms of consumption (*a*) for enjoyment and (*b*) for the purpose of maintaining productive capacity or (*c*) that of adding to the latter. All consumption directly by human beings, since it does not affect capital values in the marketable sense, has to be treated as ultimate consumption, even though we are well aware of the mixture of ends actually involved.[1]

4. Every new increment of investment, whatever physical or other form it may take, is added to an organised productive system. In fact, this is true in a doubly complex sense. In the first place, practically without exception, it will be added to some kind of more or less distinct primary technical production unit, a "plant" in the narrow sense (if not to a particular individual "machine"). But this individual plant will be technically interrelated with other plants, in both a "horizontal" and a "vertical" series. In the second place, any new increment of capital is the property of some owner, individual or corporate, and its rôle in production, and more especially in changes in production, will be profoundly affected by these ownership relations. In consequence, as noted above, the replacement of any physical item of equipment has in greater or less degree the character of replacing a part of a machine. The cost, yield, and value—*i.e.* the quantity—of an investment item or increment, reside largely in organic relationships, rather than in particular physical things or conditions.

[1] It is to be noted, however, that there is a form of capital, called "good will," which is created by investment, and owned and bought and sold, the real substance back of which is a state or attitude of human beings.

5. Enough has been said to make it clear that neither of the processes discussed by Professor Hayek in connection with the structure of investment (*i.e.* neither changes in the durability of goods nor changes in their construction period) exerts an identifiable effect on a definable " period of production " in society as a whole. Moreover, they are similarly unconnected with quantity of investment, and quantity of investment is likewise unconnected with any production period. Correspondences in this field are limited and accidental, without theoretical significance for the nature and rôle of capital. It is extremely difficult to give any intelligible meaning to a " period of production," and it certainly has no meaning of the sort assumed in the Böhm-Bawerk–Hayek theory of capital. The production period for consumed services, if the expression is to be used at all, is zero, while the production period for the capital equipment of society is all past economic history.

It is true that in production particular materials go through technical processes and exist in the form of particular named things for intervals which can be *more or less* definitely dated as to beginning and end. If a particular method of identifying and naming the things and dating the life termini of each could be agreed upon, and if the list itself remained unchanged, it would be possible to speak of a change in the average length of all such processes.[1] Both these assumptions are widely contrary to fact, and the period in question would have no meaning for economic analysis if determined. A practically indefinite number of " things," in every relation of simultaneity and succession, are involved in the production of any increment either of satisfaction or of wealth. There is also more or less used in business management discussions a notion of an average " turnover " of investment. This might be defined in several different ways and is not scientifically usable even for accounting purposes.[2] But none of these concepts is a genuine average, and none of them either corresponds to the Böhm-Bawerk conception of a production period, or has any significance for the theory of capital; none of them will at all necessarily increase in length with an increase in total investment.

If an account with a particular " thing " is set up and kept

[1] The mode of averaging would be restricted by the fact that items approach zero and infinity as limits.

[2] In the ECONOMIC JOURNAL for March 1934, Marschak very neatly shows that the conception of the production period, developed by Mr. Gifford (ECONOMIC JOURNAL, Dec. 1933) reduces to one of these possible turnover formulas, namely capital divided by total income—incidentally one of the least meaningful.

from the moment it begins to affect economic plans to the moment it ceases to do so, and even if the end of the interval really represents approximately complete liquidation into products already consumed—it is evident: First, that no assignment of a time interval can be made either (1) to the production and consumption of the increment of output consumed in any small increment of time, or (2) to the period of investment of the increment of resource services expended in any small increment of time. (Professor Hayek in effect admits this in his paper.) Second, it is also evident that if the capital-creation-and-use in question is profitable at all, the time required to produce the total amount of output yielded before final liquidation is probably *decreased* by the project. (If the product is unique this is true of its value.)

6. Exceptionally, if ever, strictly speaking, is real liquidation of a concrete item into consumed product in question, and only within fairly narrow limits is it possible. Where an enterprise as a whole is initially planned for liquidation (closing of its books) at a foreknown date, a part of the equipment used will be planned for the life of the enterprise, and another part not amenable to this treatment will be planned primarily for the largest possible recovery or "salvage" value. Even then, capital is typically invested in some other form as it is written off out of its gross yield. In general, capital investment is planned for perpetual maintenance, as capital, including any necessary replacement by items of some kind. Possibility of liquidation, and occasionally the fact, is important to an individual, but normally this means sale to a new owner. Mobility of investment is important both technically and economically; but the relation of construction period and service life to mobility constitutes two distinct problems (see below, section 8).

7. With reference to a new venture of any kind, which represents a net addition to capital—whether it is a new enterprise or plant, or a nominally distinct concrete device, an "improvement" in any existing item, the creation of good will, or whatever form it may take—the interval between the decision which is the starting point of the venture, marked by setting up an account with it, and the date when the result as a productive unit begins to operate at something like normal capacity, is more or less determinate. This is the construction period in the proper, accounting sense, for the item. It is a fallacy to treat this interval as a part of the production period for the output subsequently made by the aid of the capital produced. This might be reasonably done only if either (*a*) the entire future output of the investment

increment through all time is considered as a unit, or the investment is really liquidated and consumed, which implies a general net liquidation of the economic system. In any case, the entire social equipment in existence when the venture is started—accumulated through all past time—is included in the " primary factors " used indirectly through producing the new capital increment, which means that technically the production period is all past time. The fact that making an investment requires time no more adds to the production period for any subsequent product of any " unit " to which any increment of investment is added than does the fact that disinvestment (see next section) requires time mean that that time, if it could be determined, would be added to the production period for the subsequent output of society, or of any definable unit of capital from which the particular decrement is subtracted.

In any society which as a whole maintains its total capital quantitatively intact, all liquidation is in effect transfer of investment from one holder or one form to another holder or form, or both.[1] No particular item of investment once made and incorporated into the productive system of a social economy can ever be said to be liquidated at any particular time, and this would remain true if the end of the world could be foreseen by any interval in advance, and if the entire system went through the most rational and complete possible process of liquidation. Thus the duration of an investment is to be completely separated in thinking from the durability of any particular thing or group of things in which the investment is " embodied." In general, the duration of all investments, in a society which is at least fully maintaining its total capital, is infinite, even though the investment " in " a particular thing, or the investment " owned by " a particular individual or corporate person, is liquidated, either through sale or through consumption of the replacement fund.

It is also to be emphasised that the amount of capital which can be withdrawn from any investment by under-maintenance has no definite relation to its cost of production. It is largely relative to the speed of withdrawal; but neither the amount " disinvestable " nor the possible speed of disinvestment has any

[1] The notion of maintaining any capital quantitatively intact cannot be given exact definition; but this limitation applies to all quantitative analysis in economics, and the notion itself is clear and indispensable, and measurement, even, is fairly accurate. For most problems, moreover, the total in an absolute sense is not important; an addition to or subtraction from one account not involving a directly offsetting subtraction from or addition to some other is all that need be identified.

definite relation, either to the construction period or to the "normal" annual maintenance charge. Amount and speed of withdrawal are both further relative to distance and accuracy of foresight, especially to plans at the time an investment is physically committed. The amount of the present wealth of any nation which could be liquidated into consumption in any interval before an announced annihilation catastrophe would be limited, however remote the date. But, as already noted, any investment item which is the subject of a capital account can be "written off" in any interval, if, and only if, it has a sufficient yield above pure interest; and no investment in things of limited productive life will ever knowingly be made unless the imputed income is adequate to write it off (with allowance for salvage value) and replace the source with one of equal yield, in that period.

8. The connection in which time is really significant is that of the *mobility* of capital, freedom to transfer it to some other use. But in this connection we must avoid a common and fatal confusion between real, technical and economic mobility, and something utterly different. What people really want to do, in the main, by way of liquidating investments, especially in connection with a depression, is to convert them into "money," not into consumable product, and this is, of course, a problem in the theory of money, and not one in the theory of capital or production.

Real movement of capital from one field to another may involve either of two processes, either the use of the same concrete things in a different connection, or their replacement by other things differently specialised. Physical transfer may, of course, in addition, be accompanied with more or less alteration or reconstruction. In the transfer of capital from one field to another, durability (*i.e.*, its opposite) is an element, but one the importance of which it is natural to exaggerate enormously. Mobility, whether through physical transfer or replacement, must be considered in connection with the structural integration of a particular item in the entire industrial system in which it is used, and this includes the "labour" of every kind and grade as well as the "property" element. Obviously, mobility has no meaning in connection, say, with a part of a machine, apart from the machine as a whole. But this is true, with a difference in degree at most, of the production unit of which the machine is an element. Even the business enterprise cannot be considered independently. (Any unit separately owned will, if mobile, be in an independent position in that it can always force the larger, relatively immobile unit of which it is a part to give it an income share on the basis of

the best opportunity which may be open to it.) In general, the mobility of any item tends to be less than that of the most immobile item with which it is complementary in use—rather that of any organisation as a whole of which it is a part, and this immobility is likely to be much greater than that of any single item in it.

The discussion of mobility is confused by the further fact that the real problem is almost entirely one of uncertainty. As already shown, there is no problem of mobility if the time and conditions of transfer are anticipated when an investment is made. When either a particular transfer, or general fluidity at a known date in the future, is planned for when the investment is made, the effect on the durability or permanence of particular concrete items will run partly in each of the two possible opposite directions; in a complex unit as a whole, some items will be built more cheaply and of shorter life, in order to minimise loss on abandonment, while others will be made more expensive and more durable, but of more standardised design, so as to have the maximum value for other uses when the given project is liquidated. The latter case is common enough in connection with buildings, for example, where extra expense in construction is often incurred to facilitate re-adaptation to some other use in the event of a decline in the demand for the service for which they are initially designed.

9. Particularly in connection with cycle theory, actual mobility of investment is approached in importance by the possibility of temporary, partial postponement of maintenance, without loss of use value. Here it is of some consequence that the part of maintenance which figures as replacement superficially appears to be postponable by an interval bearing some relation to the service life of the items involved. But this is the standpoint of the individual enterprise and an accident of its scope. Actual technical possibility of postponing production of replacements without interrupting operations depends on a complex of conditions.

10. Of comparable importance, again, is the freedom to leave an item out of use without deterioration or other upkeep cost. There are, of course, types of property which deteriorate as fast when kept idle as when used at normal capacity, or even faster.

Under this last item, again, the ramifying complementary technical relationships and connections of ownership must be considered in determining what is the effective investment unit for which freedom of use or non-use is in question.

So important that it must be repeated in conclusion, is the fact mentioned in connection with mobility (section above), that

the entire notion of fluidity in investment in connection with crises and depressions is largely an individualistic delusion—a "fallacy of composition." In a time of depression, when people are clamouring most madly to convert assets into money, there is little or no question of an actual physical liquidation of plant into consumption. The phenomenon is partly one of maladjustment, mainly one of money, prices, and debts. The fluidity chiefly in question is marketability for cash, and the practical difficulty and the theoretical problem lie in the field of "cash" rather than in the technical properties of investment goods.[1]

In connection with the "jam" which occurs at a time of depression, the way in which the situation would be altered if the "investment structure" in the dual sense discussed by Professor Hayek were lengthened or shortened, is a problem of almost infinite complexity. Only two or three considerations can be briefly mentioned here. First, it is undoubtedly true that the time required to carry out any industrial expansion involves a lag in yield which is an important factor affecting the amount of "over-investment," whether relative or absolute—or whatever that apparent over-development of capital goods industries which is of undoubted importance in cycle theory may finally be found to mean. And the time required to construct capital goods is a factor, but only one among other factors, in the lag of increase in output behind expansion activities. Second, immobility of the productive agencies tied up in any over-developed line is undoubtedly an important fact in the depression phenomenon. But (third) whatever rôle is assigned to technical maladjustments of any and every kind in cycle theory, it is perfectly certain that the durability of capital goods is only one factor in the economic immobility of capital itself, and also (fourth) that the immobility

[1] In this connection it is, of course, fundamental that in the modern world "cash" itself arises largely out of debts whose power to perform this function depends on their own liquidity in terms of "money" in a narrower sense. But the confusion of this liquidity of loans with the "disinvestability" of capital which is implied in the Hayek theory of crises is a fallacy even more egregious than those considered in detail above. Loan liquidity means, and can mean, nothing but marketability for money, either of the evidence of indebtedness as such or of disposable assets of the debtor. Maturity dates are largely illusory, superfluous and evil, but only their meaning is in question here. They make some or all of the assets of the borrower a guarantee of the money value of the debt at a stated date. To interpret a maturity as meaning an obligation of the debtor to "liquidate" in a real sense, *i.e.* convert his capital goods into products and turn these over to the creditor, is surely an absurdity difficult to surpass. There is small likelihood that the lender would want the products, and little more presumption that they would be more convertible into any particular amount of "money" than any other assets.

of labour (including, of course, specially trained people) is of fully comparable importance with the immobility of property; and furthermore (fifth), that economic inflexibility in the large is in large part a matter or price "stickiness," along with physical considerations.

In short: A depression, in its critical aspect of serious unemployment (of persons and of property) no doubt generally involves more or less previous mistaken commitment of resources, human and non-human, sustained by immobility. But it is *essentially* a matter of price maladjustment, sustained by price stickiness. If labour were mobile and wages flexible, no fixity in the capital structure would give rise to unemployment, of labour or capital, though efficiency might be greatly reduced. The importance of the first is in any case relative to the second. The rôle of capital durability and production period is limited to contributing toward the wrong commitment and immobility of a relatively small fraction of the productive resources of a system. It is at most a not very large fraction of another similar fraction of the cause or means of cure of the basic evils.

There is no theoretical reason why there should not be fully developed and completely typical cycles in a society in which no capital goods whatever were used. Such a situation may be visualised by considering what might happen if all economic production had the form of personal services, say, of vocal music, especially if largely organised in the form of the chorus. The phenomena of training periods and resistance to retraining, in relation to changes in demand, and to money, credit, and price changes and resistance to change, would be present and adequate to give rise to all the characteristic manifestations now met with. The example is especially in point since the "production period" would clearly be of zero length. Under these conditions no one would think of trying to compute an average period of immobility for a fraction of the productive resources of society and treat it as a "period of production." [1]

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[1] Since the publication of the *Economic Essays in Honour of Gustav Cassel* and of Professor Hayek's article, there has appeared in *Economica* an article of my own entitled "Capital, Time, and the Interest Rate" covering some of the same ground as the foregoing. If there is for some readers some repetition, no one is under compulsion to read both articles; and I am also reminded of the apology for repetition with which Herbert Spencer concluded the Preface to his *Data of Ethics*: "Only by varied iteration can alien conceptions be forced on reluctant minds."