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## REFLECTIONS ON INVESTMENT IN MAN

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THE analytical scaffolding of these studies rests on the proposition that people enhance their capabilities as producers and as consumers by investing in themselves. It implies that not all of the economic capabilities of a people are given at birth, or at age fourteen when some of them enter upon work, or at some later age when some complete their schooling; but that many of these capabilities are developed through activities that have the attributes of an investment. These investments in people turn out not to be trivial; on the contrary, they are of a magnitude to alter radically the usual measure of the amount of savings and capital formation. They also alter the structure of wages and salaries and the amount of earnings relative to income from property.

These alterations are clues to long-standing puzzles about economic growth, structure of relative earnings, and the distribution of personal income. Inasmuch as these alterations are a consequence of investment in human capital,

are these investments a key factor? I wish to propose the following hypotheses in pursuing these matters: (1) In economic growth, based on the assumption that the fundamental motives and preferences which determine the ratio of *all* capital to income remain essentially constant, the hypothesis here advanced is that the inclusion of human capital will show that the ratio of *all* capital to income is not declining. Producer goods—structures, equipment, and inventories—a particular stock of capital has been declining relative to income. Meanwhile, however, the stock of human capital has been rising relative to income. If the ratio of *all* capital to income remains essentially constant, then the unexplained economic growth which has been so puzzling originates mainly out of the rise in the stock of human capital. (2) The next assumption is that the economic capabilities of man are predominantly a *produced means of production* and that, except for some pure rent (in earnings) for differences in inherited abilities, most of the differences in earnings are a consequence of differences in the amounts that have

<sup>1</sup> I am indebted to Larry A. Sjaastad and George J. Stigler for a number of helpful comments.

been invested in people. Here, then, the hypothesis is that the structure of wages and salaries is primarily determined by investment in schooling, health, on-the-job training, searching for information about job opportunities and by investment in migration. (3) With respect to the distribution of personal income, based on the assumption that the rise in the investment in human capital relative to that invested in non-human capital increases earnings relative to property income and that the more equal distribution of investments in man equalizes earnings among human agents, the hypothesis here proposed is that these changes in the investment in human capital are the basic factors reducing the inequality in the distribution of personal income. One of the implications of this formulation is that modifications in income transfers, in progressive taxation, and in the distribution of privately owned wealth are relatively weak factors in altering the distribution of personal income.<sup>2</sup>

I have placed the paper by Gary S. Becker first because it gives the reader an overview of the pervasiveness of human capital and because it reveals many vistas awaiting to be explored. As is well known, the precise analytical tools that will be required when one enters upon basic research are, as a rule, among the unknown in the game of research. Becker started his study with the aim of estimating the return to college and high-school education in the United States. He soon discovered, however, that the investment activities associated with education were akin to other investments in people and that all of these activities had a number of attributes in common for which re-

ceived theory, tailored to investments in structures and equipment, required reformulation. I shall return to Becker's contribution below; before doing so, however, there are a number of general implications of investment in man which deserve a brief comment.

In these reflections I shall restrict myself mainly to the role that investments in man play as a source of economic growth, and thus I do not examine the other two basic matters. It is now generally agreed that the conventional measures of inputs are inadequate for studying growth. Without assessing the claims that the increases in the amount of capital represented by structures, producer equipment, and even of inventories are underestimated because improvements in such resources are not reckoned, there can be no doubt whatsoever that the concept of a labor force, or of man-hours worked, fails to take into account the improvements in the capabilities of man. It is as if we had a map of resources which did not include a mighty river and its tributaries. The particular river, on which this set of papers concentrates, is fed by schooling, learning on the job, advances in health, and the growing stock of information about the economy. Each of these is treated as an investment activity which develops human capital. Migration is also treated in this way because analytically a misplaced resource is equivalent to a less productive resource properly located.

But does this not give too much weight to the growth in the quality of human resources? Let me illustrate in a rough way the possible implications of the quality component. Suppose there were an economy with the land and the physical reproducible capital including the available techniques of production that we now possess in the United States,

<sup>2</sup> In this paragraph I have drawn on the last section of my forthcoming essay, *The Economic Value of Education* (to be published under the auspices of the Ford Foundation).

but which attempted to function under the following restraints: there would be no person available who had any on-the-job experience, none who had any schooling, no one who had any information about the economy except of his locality, each individual would be bound to his locality, and the average life span of people would be only forty years. Surely, production would fall catastrophically. It is certain that there would be both low output and extraordinary rigidity of economic organization until the capabilities of the people were raised markedly by investing in them. Let me now take a Bunyan-like step and suppose a set of human resources with as many but no more capabilities per man than existed as of 1900 or even as of 1929 in the United States. The adverse effects on production in either case would undoubtedly be large. To continue these speculations, suppose that by some miracle India, or some other low-income country like India, were to acquire as it were overnight a set of natural resources, equipment, and structures including techniques of production comparable per person to ours—what could they do with them, given the existing skills and knowledge of the people? Surely the imbalance between the stock of human and non-human capital would be tremendous. Last, in this vein, let me suggest an imbalance between these two forms of capital which would be the converse of that already considered, namely, a country which would be long on human capital relative to her stock of reproducible non-human capital. The circumstances that characterized a number of European countries, notably West Germany (also Japan) immediately following World War II may have been an imbalance on this type; and consistent with this characterization, the rate of return to subse-

quent investment in non-human capital appears to have been exceedingly high.

There is excitement in the recent search for a conception of economic growth that would explain past growth and indicate future growth. The frequently observed divergency between increases in national product and increases in resources left much to be explained. The puzzle confronting economists has been that the rate of growth in the output that was being observed has been much larger than the rate of increase in the principal resources that were being measured.<sup>3</sup> It is now clear that this puzzle is largely of our own making because we have been using estimates of capital and labor which had been refined and narrowed in ways that excluded many of the improvements that have been made in the quality of these resources. Thus by no stretch of the imagination is it possible to explain the growth in the real national income of the United States, say, between 1929 and some recent date using only these "refined" estimates of real stock of capital and of man-hours worked. Meanwhile, economists have come upon numerous signs pointing to improvements in the quality of human resources as one of the major sources of economic growth. To explore what lies back of these signs, a theory of investment which includes people is essential.

Simon Kuznets long ago directed attention to large gains in the income of workers which he attributed to "shifts from industries with lower to industries with higher income per gainfully occupied."<sup>4</sup> These interindustry shifts in the

<sup>3</sup> I too have elaborated on this puzzle in "Investment in Man: An Economist's View," *Social Service Review*, XXXIII (June, 1959), 114-15; and in "Investment in Human Capital," *American Economic Review*, LI (March, 1961), 5-6.

<sup>4</sup> Simon Kuznets, *National Income: A Summary of Findings* (New York: National Bureau of Economic Research, 1946), pp. 42-49.

labor force, according to Kuznets, have accounted for about four-tenths of the total rise in income per worker.<sup>5</sup> Are these gains a windfall? Or are they a quasi-rent caused by a persistent lag in the adjustment in the supply of labor? It seems far more reasonable that they represent rather a return to an investment in skills and knowledge and in information about job opportunities and in migration. The treatment by George J. Stigler of the search for information about jobs in terms of the costs of acquiring such information and the return it fetches and a comparable treatment of migration by Larry A. Sjaastad present new hypotheses based on investment in human capital for analyzing a part of these interindustry shifts. The new skills are here also treated as an investment in man.

Kuznets, as already observed, attributed four-tenths of the large increases in real earnings per worker to interindustry shifts. Thus, six-tenths of these increases were left "unexplained." Here, again, these gains in real earnings may not be windfalls or quasi-rents to labor. As before, they probably are predominantly a return to investment in skills and in related capabilities. Learning on the job and in schools has undoubtedly been an important source. A pioneering paper by Jacob Mincer treats "training on the job" as an investment that employees make in themselves. He presents estimates of the amounts invested in such training by males in the United States labor force, which came to \$5.7 billion during 1939 and to \$12.5 billion in 1958, both in 1954 dollars.<sup>6</sup>

Although Mincer's estimates are annual gross investments, since they are

made by workers when they are relatively young, they have a long productive life. Accordingly, the accumulative effects, or, if you wish, the annual net investment, must be large indeed. When we turn to schooling, estimates can be obtained more directly than for training on the job, although earnings foregone which are beset with difficulties become important after elementary schooling. My estimate of some time back of total costs of elementary, high-school, and college and university education, including earnings foregone by students, came to \$28.7 billion for 1956.<sup>7</sup> The stock of "educational capital" in the United States labor force rose from \$180 billion to \$535 billion between 1930 and 1957, in 1956 dollars.<sup>8</sup> The estimated return to this additional "educational capital" in the labor force would appear to account for about one-fifth of the economic growth of that period. Edward F. Denison, meanwhile, has developed an approach to the *sources* of economic growth in which the contribution of labor is adjusted for particular improvements in the quality of labor. His technique of estimating the increases in national product associated with these quality components is not based on first ascertaining the investment made by means of schooling, on-the-job training, and the like, and then

<sup>6</sup> For males, Mincer's hypothesis and estimating technique place the total costs of the learning acquired on the job at four-fifths of the total costs of learning acquired in schools during 1939; whereas about two decades later, during 1958, the total cost of on-the-job learning was only two-thirds that of learning in schools (see his "On-the-Job Training: Costs, Returns, and Some Implications," Table 2, in this Supplement).

<sup>7</sup> See my "Capital Formation by Education," *Journal of Political Economy*, LXVIII (December, 1960), Table 7.

<sup>8</sup> See my "Education and Economic Growth" in *Social Forces Influencing American Education*, ed. N. B. Henry (Chicago: University of Chicago Press, 1961).

<sup>5</sup> *Ibid.*, p. 48; and his "Long Term Changes in National Income of the United States Since 1870," *Income and Wealth of the United States* (Cambridge: Bowes & Bowes, Ltd., 1952), p. 126.

attempting to gauge the return to these investments. His technique goes directly to particular quality components and relates them to the increases in earnings. This is not the occasion to pursue the analytical challenge which is implicit in Denison's "comprehensive" set of *sources*. Suffice it to say that his estimates, also, attribute about one-fifth of the economic growth of the United States between 1929 and 1957 to education.<sup>9</sup> The historical comparisons shown in Table 1 of his paper lend support to the following inferences: (1) The contribution of education to growth between 1909 and 1929 was a little more than one-half of that between 1929 and 1957; (2) the projected further growth from this source from 1960 to 1980 is a little less than that from 1929 to 1957; (3) for the longer run, it is impossible to maintain the *rate of increase* in the amount of schooling achieved during recent decades; (4) whereas physical capital contributed almost twice that of education between 1909 and 1929, the contribution of education to economic growth between 1929 and 1957 exceeded that of physical capital.<sup>10</sup>

In theory, investment is obviously a basic factor and the amount of investment a critical magnitude in economic growth. But in studies made of economic growth the amounts invested appear to

<sup>9</sup> His table of the sources of the growth in real national product allocates 23 per cent of the growth rate in 1929-57 to education. This is a gross figure. Since there are among his "sources" some that have had a negative effect, his positive percentage points total 109 and the 23 percentage points attributed to education represent, therefore, about 21 per cent of the positive sources of economic growth.

<sup>10</sup> Denison has not adjusted physical capital for improvements in quality except to the extent they require larger use of resources. Among his sources of growth, almost one-third is allocated to the "increase in output per unit of input," including one-fifth allocated to the "advance of knowledge." Much of this contribution is made effective through improvements in capital goods.

be a weak factor. A practical difficulty in determining the effects of investment upon growth arises out of the narrowness of the concept of investment on which the available estimates are based. A concept restricted to structures, producer equipment, and inventories is all too narrow for studying either the growth that is being measured (national income) or, what is more important, all gains in well-being from economic progress which would also include the satisfactions that people derive from more leisure, from the growing stock of consumer durables, and from the satisfactions that come to people from better health and more education—all of which are as a rule omitted in estimates of national income.

Kuznets sees the matter clearly at one point in his most recent monumental study when he observes that for "the study of economic growth over long periods and among widely different societies—the concept of capital and capital formation should be broadened to include investment in health, education, and training of the population itself, that is, investment in human beings. From this point of view the concept of capital formation followed here is too narrow."<sup>11</sup> Only the most diligent reader, however, will see and keep this limitation in mind in drawing inferences from Kuznets' estimates and findings. It is the slowing down in the pace at which his "capital" is formed that will be seen. But this fact will not be related to the quickening pace in the formation of human capital, nor to the even tempo of capital as an aggregate. Thus, a concept of capital that is restricted to structures, producer equipment, and inventories (the omission of

<sup>11</sup> Kuznets, assisted by Elizabeth Jenks, *Capital in the American Economy: Its Formation and Financing* (a study by the National Bureau of Economic Research [Princeton, N.J.: Princeton University Press, 1961]), p. 390.



expenditures on research is also serious) may unwittingly direct attention to issues that are not central or critical in understanding economic growth over long periods. The concern about the distinct downward trend in the ratio of this type of investment (net "capital" formation) to national income is one of these issues. Another is the importance that is attributed to the decline in the ratio of this class of capital to national income. There are no compelling reasons why the

crease applied to the stocks shown in Table 1 for 1957 indicate an incremental increase of \$25.5 billion for "reproducible tangible wealth" and \$40.5 billion for the two classes of human capital. The ratio of the sum of the stock of human and non-human capital to net national product was slightly above 6 in 1929; this ratio was also virtually 6 in 1957. The amount of capital formed was equal to about 26 per cent of net national product in both 1929 and 1957.<sup>12</sup>

TABLE 1  
ESTIMATES OF VARIOUS STOCKS OF CAPITAL AND ANNUAL RATES OF INCREASE  
BETWEEN 1929 AND 1957, IN THE UNITED STATES IN 1956 DOLLARS

	BILLIONS OF DOLLARS		ANNUAL RATE OF GROWTH (PER CENT)	RATE APPLIED TO 1957 (2) × (3) (BILLION DOLLARS) (4)
	1929 (1)	1957 (2)		
1. Reproducible tangible wealth . . . . .	727	1,270	2.01	25.5
2. Educational capital in population . . . . .	317	848	3.57	30.3
3. Educational capital in labor force . . . . .	173	535	4.09	21.9
4. On-the-job training of males in labor force . . . . .	(136) for 1939	347	5.36	18.6
5. Total of Lines 3 and 4 . . . . .				40.5

Source: line 1: Raymond W. Goldsmith, "Statistical Appendix" to *The National Wealth of the United States in the Postwar Period*, Table A-2, adjusted to 1956 dollars (quoted with permission of Goldsmith); lines 2 and 3: "Education and Economic Growth," in *Social Forces Influencing American Education*, ed. N. B. Henry (Chicago: University of Chicago Press, 1961), Table 14, with 1930 estimates reduced by 3.57 and 4.1 per cent respectively to give estimates for 1929; line 4: rough guesses based on Table 2 in Jacob Mincer, "On-the-Job Training: Costs, Returns, and Some Implications," appearing in this Supplement. An estimate for 1958 was adjusted downward by 5.36 per cent to obtain the 1957 figure and to place both 1939 and 1957 on a 1956 dollar basis; the 1954 dollar estimates were increased by 4.6 per cent.

stock of any particular class of capital should not fall (or rise) relative to national income over time. Producer goods—structures, equipment, and inventories—are such a class. The fact, however, that investment in this class has been declining relative to the investment in human capabilities acquired by learning on the job and in schools and in other ways raises a major economic question: have the decisions which account for this shift been motivated by differences in return?

On the basis of the tentative estimates of stock of educational capital in the labor force and of training on the job by males, the average annual rates of in-

No doubt the growth in investment in man has improved markedly the quality of work entering into economic endeavor, and these improvements in quality have been a major source of economic growth. But what explains the correspondingly high rate of increase in the demand for

<sup>12</sup> The net national product, in 1956 dollars, is estimated to be \$159 billion in 1929 and \$359 billion in 1957. The capital stock of training on the job of males in the labor force in 1929 is "placed" at \$66 billion. The rates of increase applied to 1929 stock are as follows: 4.22 per cent to reproducible tangible wealth, 3.54 per cent to educational capital in the labor force, and 7.5 per cent to the stock of on-the-job training (males only). The rates of income applied to the 1959 stock are 3.93, 5.9, and 3.1 per cent, respectively.

these acquired abilities? Nowhere have we come to grips with this question. Is this demand for skills and knowledge in labor specific to our economy? Or is it also to be observed in low-income countries? It is hard to believe that the demand for these quality components in labor increased rapidly during the early industrialization in western Europe. Labor was then abundant and "cheap," it was mainly illiterate and unskilled, and it did mostly manual work that required much brute force. Improvements in skills and knowledge and health of workers generally appear not to have been prerequisites to the impressive economic growth of that period.<sup>13</sup>

Despite a flood of workers schooled beyond the elementary grades entering the labor market, the earning differentials in favor of workers with such schooling imply that the *rate* of return to the costs of the additional schooling has not been beaten down.<sup>14</sup> It appears to have risen somewhat during the last decade. Meanwhile, workers who had completed one to four years of high school rose from 38 to 52 per cent, and those with some college (completed one to more than four years) rose from about 13 to 19 per cent of the United States labor force, between 1940 and 1958.<sup>15</sup> If the rate of return had fallen sharply as a consequence of this flood, it

might be argued that the demand for these capabilities had not shifted so much to the right since they were being priced lower on the demand schedule.<sup>16</sup> But this seems not to have happened except for a short period for high school. Therefore, the same hard question: what factors account for the high rate of growth in the demand for these capabilities of schooling beyond the eighth grade?

Not all investment in human capital is for future earnings alone. Some of it is for future well-being in forms that are not captured in the earnings stream of the individual in whom the investment is made. Benefits that do not show up in earnings are hard to identify and measure. They are important, nevertheless, and deserve careful thought and investigation. They are least likely in connection with training on the job and in searching for information about jobs. There are some associated with migration. They are, however, most likely to be important in health and education, as is clear in Selma J. Mushkin's treatment of health and especially so in Burton A. Weisbrod's examination of the benefits of education.

Among the different classes of future contributions from investment in people, it is useful to distinguish between those that accrue to the individual or his family and those that are captured by other individuals or families. Those that accrue to the individual are of two parts: a future earnings component and a future

<sup>13</sup> See my "Investment in Human Capital in Poor Countries," *Foreign Trade and Human Capital*, edited by Paul D. Zook (Dallas, Texas: Southern Methodist University Press, 1962).

<sup>14</sup> Except, perhaps, for high school between 1939 and 1949.

<sup>15</sup> Per cent distribution by years of school completed for the labor force eighteen to sixty-four years old (*Statistical Abstract of the United States, 1960*, Table 139). Inasmuch as the length of the school year has been increasing, these estimates understate to this extent the rise in real schooling. There is some upward bias in the reports on which these estimates are based. Whether it has changed over time is not evident.

<sup>16</sup> L. A. Sjaastad, in a comment on this section, points out that since these are internal rates of return they can be deceptive. For example, the increase in the working life may have held them up. Also, if costs of schooling were to fall relative to earnings, the rates again would be deceptive. The knowledge acquired in school and on the job, like techniques of production, is being improved and the increase in the supply of educated people quite possibly creates its own demand.



consumption component.<sup>17</sup> In education, this consumption component has substantial durability, even more than (physical) consumer durables. This enduring consumer component attributed to education is the source of future satisfactions which in no way enter into *measured* earnings or into *measured* national income.

Weisbrod examines a large set of benefits from education other than the future productivity returns which are revealed in estimates of earnings as these have been treated. One of these benefits is "the value of the 'option' to obtain still further education and the rewards accompanying it." The value of this option is real for many students who are discovering their talents through education. Whether this particular benefit is to be counted among the returns, say, to the high-school education for these students who at that point discover they have the talent to reach for a college education, or to the subsequent college education, will depend upon the aim of the analysis. It is important, of course, that this particular return not be counted twice. Several non-market returns associated with education which come to the individual who has acquired the schooling are also examined. There are then the benefits which do not accrue to those who have received the schooling. Other families capture some benefits as neighbors and as taxpayers, both seen in relation to the place in which the person with the schooling resides. Then, too, there are employment-related benefits which go to co-workers and to employers. It is Weisbrod's belief that these several benefits of education "are reasonably identifiable." There then re-

<sup>17</sup> See my "Investment in Human Capital: Reply," *American Economic Review*, LI (December, 1961).

mains a residual category of benefits which are widely diffused in society.

A theory to cope with investment in people as set forth by Becker becomes a rich source of hypotheses to be tested. These hypotheses reach into old issues which have long perplexed investigators and into new exciting ones. Becker begins by deriving the "general relations between earnings, rates of return, and the amount invested" and by showing "how the latter two can be indirectly inferred from earnings." He then builds on these relationships by introducing particular key attributes of the costs entering into human investment and of the rates of return to such investment. The promise with which Becker opens his paper, namely, to show that at the level of formal economic analysis human investment offers a unified explanation of a wide range of empirical phenomena, is abundantly fulfilled. One is tempted to direct attention to a number of these hypotheses, but this would be a mistake at this juncture because they might better be studied in the context of Becker's paper and because the list would seem long and even burdensome without any discussion of the relevant empirical behavior.

The exploratory aim of the conference for which these papers were prepared needs to be underscored. It is only very recently that studies of human investment have been undertaken. These studies all enter upon empirical research, in particular to a separation of acquired from inherited capabilities. The three basic matters mentioned at the outset—economic growth, structure of wages and salaries, and the distribution of personal income—are being clarified. The findings thus far support the hypotheses advanced at the beginning of this paper.