

Human Capital

Thomas S. Coleman

Draft – March 2, 2017

PEOPLE: Gary Becker, T.W. Schultz, Jacob Mincer, and many others

RELATED: Economics of the Family; Household Production

DATES: Gary Becker published *Human Capital* in 1964

CHICAGO: Gary Becker earned his PhD from Chicago in 1955. After teaching at Columbia from 1957 to 1968 he returned to Chicago where he remained until his death in 2014

VIGNETTE

The idea of human capital so thoroughly pervades economic discourse that it can be hard to imagine a time when it was not central to our thinking as economists. And in some respects it has always been part of economics: Adam Smith in *Wealth of Nations* “identified the improvement of workers’ skills as a fundamental source of economic progress and increasing economic welfare.” (Sherwin Rosen in *The New Palgrave* Eatwell et al. [1987]). But it is undoubtedly Gary Becker who brought together the ideas that we know today as human capital and ensured its central role in economic thought.

The central idea of human capital is simple, indeed so simple that today it is almost self-evident:

- As human beings our current skills and capacities are a capital stock, the result of prior investments by ourselves and others
- Current earnings and other benefits are the returns or payments we earn based on those prior investments.

The idea is simple and simply stated but the implications flow to labor economics, macroeconomics, development, economic history – indeed all corners of economic thought.

There are two related results from viewing skills as a capital stock:

1. Decisions over time are critical and we must consider any current decision in the context of past investment and future potential returns
2. Human beings and everything around them are dynamic and malleable – static views of the world are not appropriate

So let us consider a little more carefully what we mean by human capital and what are the implications.

What is Human Capital

Skills and knowledge take time to develop and accumulate. Learning to play the piano takes time and practice. Learning calculus takes time and effort. Learning to ski is slow and difficult. Even growing to maturity takes time and requires investment in nutrition and health care. Virtually none of our skills or attributes comes immediately or for free. Every component of ourselves as humans requires decisions where we weigh future benefits versus present costs. This is such an obvious part of the human condition that we hardly give it a second thought and we make such investment decisions every day of our lives. But until Gary Becker brought the issue to the fore it was not a central tenet of economic thinking.

And yet there are profound implications to the the dual facts that, first, we can change our skills and attributes but that, second, doing so is a slow and costly process. The malleable and mutable nature of human skills means that “labor” is not a fixed input but will vary both across people at a point in time and across time for individuals and nations. The “average worker” today is quite different from the average worker in 1850 – more skilled, better trained, even taller and stronger.

Similarly, the fact that investment today brings rewards in the future means that the past, the present, and the future are linked in fundamental but measurable ways. Today’s decisions are constrained by the past investments that produce today’s stock of capital. In turn today’s decisions are shaped by future prospects through comparing the present value of future benefits versus present costs (both direct costs and foregone benefits).

Capital theory has a long history in economics. One could argue that finance is nothing more than calculating and comparing present values for alternative investments. In a sense human capital theory adds nothing new; the tools and ideas for analyzing capital investments have been with us for a long time and once we recognize that our skills and attributes are indeed a capital stock then the transition to human capital is natural.

There are two factors, however, that makes the analysis of human capital different from physical capital. The first is relatively simple and not fundamental: in practice human capital cannot be bought and sold, only rented. The stock of capital is innately tied to the individual who accumulates it and the benefits from that stock will accrue to the owner. The second factor is less concrete and far more important: the power and value of human capital theory is not in the idea itself (which is relatively straight-forward) but in the myriad applications and implications for human behavior that we can infer from the theory and test with evidence.

Physical capital is really just an intermediate good for the production of yet other goods – an input into a production process that produces items we actually care about. Human capital, in contrast, is both an input into the production process and a consumption good itself. And since we as humans undertake so many activities, human capital enters into multiple and crucial production processes: physical production of goods and services through paid and non-paid work; consumption of leisure through home production; children through families. Indeed, once we view our skills as a capital stock then it is natural to view much of what we do in our lives as production processes with our own and others’ human capital as a crucial input.

A Brief History of Human Capital

Gary Becker did not invent human capital in 1964. Some writers trace early ideas back to William Petty who in 1676 “compared the loss of armaments, machinery, and other instruments of warfare with the loss of human life” (Rosen in “Human Capital”, *The New Palgrave* Eatwell et al. [1987]). Adam Smith in *The Wealth of Nations* pointed out that workers’ skills are a crucial source of economic growth. Alfred Marshall discussed the long-term features of human capital investments and the importance of the family. Frank Knight pointed out the role of increases in the stock of knowledge in overcoming diminishing returns when considering economy-wide growth.

A key contribution was the study of economic growth and national accounts, particularly work by T.W. Schultz and Edward Denison in the 1950s and 1960s. They were interested in the sources of economic growth and the fact output grew more than could be explained by growth in inputs of raw measures of capital and labor. They attributed much of this unexplained residual to technical change and in improvements in the quality of inputs. For capital such improvements are naturally attributed to investment and accumulation of a “capital stock.” It was natural to carry some of the same ideas over to labor inputs. As Rosen says (in “Human Capital”, *The New Palgrave* Eatwell et al. [1987]) “John Kendrick ... demonstrated that the rate of return on these inclusive human capital investments is of comparable magnitude to yields on non-human capital. This line of research as a whole proves that an investment framework is of substantial practical value in accounting for many of the source of secular economic growth.”

It was Gary Becker, with *Human Capital* published in 1964 (Becker [1993]), who solidified the conceptual framework that we all now use in thinking about human capital. Becker structured his framework around the rate of return on investment, with individuals comparing the discounted present value of earnings streams resulting from alternative choices. In this respect human capital theory differs not at all from physical capital decisions. The differences arise in the applications.

Human Capital Applications

I want to briefly consider three applications of human capital: Schooling and Lifetime Earnings; Household Production; and Investment in Children. These three are important but only provide the briefest of introductions.

The related areas of labor market earnings, lifetime earnings profiles, and schooling choices are one of the iconic applications of human capital theory. Schooling has both direct costs and opportunity costs of foregone earnings. The benefit of schooling is in higher *future* earnings. The first implication of this view is that the focus must be on the intertemporal nature of life-cycle decisions rather than simple point-in-time comparisons. A doctor aged 45 does earn more than a construction worker, but part of those higher earnings is compensation for the costs (direct costs plus foregone earnings) that the doctor paid during earlier years of training. Earnings profiles for skilled occupations that require substantial investment should be steeply upward sloping, with part of the higher return in later years simply compensating for earlier costs.

With schooling, a second implication of the human capital approach is that individuals should invest in schooling until the marginal internal rate of return equals the rate of interest. This is the classic investment problem, the same condition as for felling a tree. When we observe differences across individuals in schooling choices (and subsequent earnings profiles) we have to recognize that at least some part is simply equalizing differences on costs of schooling (direct costs and foregone earnings). In the limit where all individuals are identical, in equilibrium the higher earnings of individuals with more schooling simply cover the costs of the extra schooling. This has important implications for examining earnings inequality because some portion of the distribution is simply compensation (in equilibrium) for differences in costs.

A second application of human capital ideas is to household production and time allocation. A central tenet of the theory is that human capital (the stock of skills and attributes) enters into the firm’s production function; “labor input” is measured by the type and quantity of human capital rather than simply the number of bodies. Once we have made the conceptual leap to human capital as an input to a firm’s production function, it is a short step to consider production of consumption goods with inputs of human capital, physical capital, and time.

As consumers we do not simply buy our consumption goods, things such as “dinner” or “leisure reading” or “skiing”. We produce those goods with inputs of purchased market goods (chicken or Dickens’s *Great Expectations* or lift tickets at Alta) combined with our human capital (skills in cooking or literacy or expertise in skiing) and, importantly, our time. Becker developed this idea in a seminal 1965 paper and later papers (Becker [1965], Ghez and Becker [1975]) and this approach has

been very productive. It has allowed us to bring to bear a set of tools and ideas from the theory of the firm, and has pushed us to consider issues such as substitutability versus complementarity of inputs in production; returns to scale in home production; public goods and externalities in the family.

The home production approach has been valuable in thinking, for example, about matching and marriage. When consumption goods and service are the result of joint production by a couple then there will be some services that benefit from substitutability (one partner may balance the home accounts, the other might do the grocery shopping) but others that benefit from complementarity (enjoyment is enhanced when both partners enjoy going to the theater or travel). When substitutability is more important then partners will tend to have different skills and attributes. When complementarity is more important (and empirically this seems to be the case) then individuals will choose partners with similar interests, background, socioeconomic status, and education. The apparent dominance of complementarity in household production and the resulting similarity in partners has important implications, tending to dampen cross-generational mobility by matching high-skilled with high-skilled partners and low-skilled with low-skilled.

Changes in household production over time can also have important implications. For example, it appears that introduction of labor-saving devices, and consequent changes in the implicit value of time is one important contributor to long-run changes in female labor force participation. Secular shifts in the production function have provided opportunities for women to shift from unpaid household work to paid market activities as the productivity of an hour spent at home has changed.

One final and, to me, fascinating example of applying the idea of investment in human capital is to fertility and family size: the quantity-quality tradeoff in child-rearing. The “demographic transition” is well-known: a country’s transition from high birth and death rates to lower birth and death rates with development and rising household incomes. From a human capital and household production perspective this makes sense. In a primarily subsistence agrarian society large family size is valuable, providing both manual labor in production and support of parents in old age. Furthermore, high infant mortality requires high fertility to actually attain large family size. In such an environment it makes sense (economically) for families to invest more in the number of children rather than the quality (education and other attributes) of each child.

In an industrialized and specialized economy, however, there are high returns to human capital. Inasmuch as parents can benefit from their children’s higher earnings, there will be an incentive for parents to invest in human capital – education, health, and other attributes that we associate with “quality” rather than “quantity”.

Conclusion

This has been nothing but a very brief introduction to the ideas of human capital. And we should not claim too much – human capital does not explain everything. Marriage is not only about substitutability versus complementarity of partners’ skills in household production. Female labor force participation is about more than labor-saving devices. Family size is about more than quality versus quantity tradeoffs. But without the organizing structure of human capital we would be missing crucial components of the story. Human capital allows us to apply economic thinking to a wide range of human activity.

References

- Gary S. Becker. A Theory of the Allocation of Time. *The Economic Journal*, 75(299):493–517, 1965. ISSN 0013-0133. doi: 10.2307/2228949. URL <http://www.jstor.org/stable/2228949>.
- Gary S Becker. *Human capital: a theoretical and empirical analysis, with special reference to education*. The University of Chicago Press, Chicago, 3rd ed. edition, 1993. ISBN 0226041204 (pbk.). original-date: 1964.

John Eatwell, Murray Milgate, and Peter Newman, editors. *The New Palgrave: A Dictionary of Economics*. Macmillan Press Limited, 1987.

Gilbert R. Ghez and Gary S. Becker. *The allocation of time and goods over the life cycle*. National Bureau of Economic Research: distributed by Columbia University Press, New York, 1975. ISBN 0-87014-514-2.