

# RETIREMENT AND HIGH LEVEL HUMAN CAPITAL

IRVING GERSHENBERG

Professor Emeritus, Economics and Senior Fellow

Gerontology Institute

University of Massachusetts Boston

## ABSTRACT

Given that demographic trends in economically advanced industrial countries such as our own continue to shift toward increasingly older, formally retired populations, we need to find ways to keep more of this older retired population productive. Economists and others differ in their estimation regarding the ability and/or willingness on the part of the retired to retain, let alone utilize the know-how, the human capital accumulated prior to retirement. This is as true for those who have spent their work life engaged in producing and communicating new ideas and synthesizing and diffusing what is known, those who have accumulated what I term high level human capital, as other members of the community of retired people. In this paper, the first of a series, I compare the pre and post retirement research productivity of a sample of retired faculty drawn from various institutions of higher education. I also present data regarding the post retirement teaching activities of this cadre of retired academics. While there is appreciable variation in both continued research and teaching activities among this sample, I find that aging and retirement has had some, but not an appreciable impact on their ability or interest in remaining research productive and, for a somewhat smaller group of academics, many of whom who note that teaching provided them with their greatest enjoyment during pre retirement, engagement in teaching continues to remain a major post retirement activity, undiminished by the passage of time spent in retirement. My data also permits commenting upon the impact made on the retirement age of faculty by the cessation of the federally mandated age of retirement law enacted at the end of 1993.

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## INTRODUCTION

Human capital, according to a recent OECD study (p. 25), can be defined as "the knowledge, skills, competencies and other attributes embodied in individuals that are relevant to economic activity." As such, human capital is an ingredient in production functions. The extent of individual or labor productivity is determined basically by three factors, namely 1) the quantity and quality of attendant cooperating physical capital, 2) the enabling institutional environment which serves to encourage/inhibit work effort and 3) human capital which is created by schooling, by workplace exposure, by on-the-job training, by social capital ('connectedness') which facilitates the utilization of human capital and may be viewed as one of its components. I will, but not necessarily in this paper, discuss each of these aspects as they may be impacted by retirement. Schooling or education is generally considered to be the most significant source of human capital for both the firm and for individual productivity because schooling enables workers to adapt to and/or implement changes in technology. Education and other forms of human capital investment increase output in a variety of ways: by generating new ideas and techniques that can be embodied in production equipment and procedures; by equipping workers to utilize the new production techniques and initiate changes in production methods; by improving the links among consumers, workers, and managers; by extending the useful life of the stock of knowledge and skills people embody.

Franz Machlup may have come closest to capturing the essence of human capital, noting that, human capital is durable yet of limited service life. It calls for maintenance and replacement as does any other exhaustible "wasting" resource; it may become obsolete before being depleted; and, as far as subjective value is concerned, it can appreciate as well as depreciate depending on the supply of complementary factors and the demand for their joint products. (p. 424) Machlup also notes that "...education and other forms of human capital investment increase output in a variety of ways: by generating new ideas and techniques that can be embodied in production equipment and procedures; by equipping workers to utilize the new production techniques and initiate changes in production methods; by improving the links among consumers, workers, and managers; by extending the useful life of the stock of knowledge and skills people embody." (p. 25)

In economically developed and technologically advanced countries it is the post compulsory educational institution, colleges and universities, which are charged with developing and imparting the kinds of know-how both demanded and required. It is in these institutions that the relatively advanced skills required for the kinds of technology adoption required in advanced economies such as our own are taught. Given the significance of education and educational institutions as centers in which human capital is both created and enhanced, those who are involved in teaching, academic research and administering these institutions fill a role of critical importance to both the economy and society at large. Those charged with the task of producing, synthesizing and diffusing ideas are society's scholars, its academics. As noted by Donald Stewart, academic faculty are not only responsible for educating 30 to 50 percent of all young people, but they train virtually the entire leadership of the society in the professions, government, business and to a lesser extent, the arts. In addition, the professorate conducts a significant

amount of basic research in scientific and public policy fields, and incidentally, provides the administrative leadership for higher education itself. (p. 206) To allow the knowledge of how to produce, synthesize and diffuse to deteriorate and languish, which may often happen, depending on the way our society views retirement, is both wasteful and counter productive. It is this know-how, accumulated retained and produced by academic scholars, diffused by them in and through colleges and universities, that I refer to in this study as 'high level human capital.'

The notion that investment which creates human capital contributes to both the economic growth of nations and to differences in wages and incomes obtained by individuals within nations has a history which extends back before the writings of Adam Smith. The concept of human capital, as noted by Eric Hanushek, (p. 15) has only recently become central to both theoretical and empirical analyses. In the early 1960s and 1970s, Theodore W. Schultz, Gary Becker, and Jacob Mincer laid the foundations of this theory. Their analyses framed the issues of investment in individual skills and provided insights into their empirical relevance.

In his retrospective on growth and education, Zvi Griliches recounts how T. W. Schultz made one of the first estimates of the significance of the growth of human capital to the growth of output, estimating that it accounted for about one fifth of observed growth and that others refined, extended and remeasured this estimate. Jorgenson, Ho, and Fraumeni, for example, found that educational improvements in the labor force accounted for about 0.5 percent per year of the growth rate of aggregate output. Griliches concludes by noting that, "The major facts are relatively clear, at least in the United States. The changing education of the labor force during the last fifty years has accounted for a significant proportion of overall productivity growth, perhaps as much as a third of it." (pp. 40 - 41)

According to Robert Barro:

Given the level of GDP, a higher initial stock of human capital signifies a higher ratio of human to physical capital. The higher ratio tends to generate higher growth through at least two channels. First, more human capital facilitates the absorption of superior technologies from leading countries. This channel is likely to be especially important for schooling at the secondary and higher levels. Second, human capital tends to be more difficult to adjust than physical capital. Therefore, a country that starts with a higher ratio of human to physical capital...tends to grow rapidly by adjusting upward the quantity of physical capital. (p. 14)

Richard Sabot has written that:

The accumulation of human capital (which he identifies as the cognitive and other skills which are augmented by education, rather than the quantity or years of schooling) has consistently emerged as an essential feature of economic growth and development....The important contribution of education is among the most robust findings of the burgeoning literature on the determinants of the variance among countries in growth rates, proving to be relatively insensitive to changes in either specification or sample composition. (p. 8-9)

According to Gary Becker, studies suggest that capital invested in men and women constitute over 70 percent of the total capital in the United States. The total invested in schooling, on-the-job training, health, information, and research and development is surely over 20 percent of gross domestic product. Technology may be the driver of a modern economy, especially of its high-tech sector, but human capital is certainly the fuel. Among the conclusions recorded by Becker are the following:

Human capital is of great importance to the modern economy; Human capital has become of much greater significance during the past two decades;

Human capital is crucial to the international division of labor; People need to invest in themselves during their whole lives;

Human capital stimulates technological innovations and the high-tech sector.

Mark Spiegel, using cross-country data with physical capital, labor and human capital (represented by years of schooling) as explanatory variables and output as the dependent variable, found that the role of human capital is to "facilitate adoption of technology from abroad and creation of appropriate domestic technologies rather than entering on its own as a factor of production." (p. 32)

With respect to the individual, Robert Hall notes that

In the United States education is a worthwhile investment. College graduates earn substantially more than high school graduates, who earn more in turn than dropouts....It is worth almost \$18,000 per year over what the holder of a BA earns to hold a graduate professional degree. The college graduate earns, on the average, about \$20,000 annually more than a high school graduate. These figures understate the true differentials because they do not include the extra fringe benefits that go with higher earnings. (p. 25)

### ***Retirement and Human Capital:***

In the long run, the stock of human capital depends on the rate at which individuals acquire knowledge, skills, competencies and other similar attributes and the extent to which they both RETAIN and UTILIZE what they have acquired.

Economists and others differ regarding the impact of retirement on the utilization of human capital, on the capacity of retired people to retain their human capital and on their incentive to utilize and enhance that human capital. According to Yoram Ben-Porath, human capital is created by individuals making investments in themselves, i.e., forgoing current earnings and consumption while attending school. Since creating human capital is an individual investment activity, it follows, he asserts, that, people make most of their investments in themselves when they are young because they have a longer period over which they can receive returns on their investment. Furthermore, "At the date of compulsory retirement, human capital loses its value. No production is undertaken, and the stock of human capital is reduced" (pp. 352 and 356)

Machlup (op. cit.) identifies two distinct uses to which human capital might be applied, namely to production processes and to consumption activities. With respect to production, he asserts that at retirement the knowledge carrier's human capital is depreciated to zero. It is at this point that the individual's stream of earnings from performance ends. But retirement at some stated age, he notes, need not coincide with the exhaustion of capacity to perform. It is quite possible that the person retiring at age 65 still has in him (or her) enough strength to continue rendering marketable services for several more years. Rather it is this termination of earnings that defines the complete erosion of the stock of one's human capital. (p. 566)

Sherwin Rosen also focused attention on individuals contributing to income producing activities, that is, to generating income for the individual. Obviously, he contends, since the retired individual is no longer engaged in producing income, hence the cessation of any value his/her human capital might have in production activities. Also, human capital depreciates. Rosen defines such depreciation as:

... negative changes in capital values which depend on the age of persons possessing knowledge and skills, and which are more or less independent of chronological time and generational differences. Depreciation arises because the ability of individuals to apply acquired skills and knowledge to income producing opportunities systematically changes with age....(occurring)...as a result of increasing probabilities of death and morbidity as well as general deterioration of mental and physical capacities associated with aging.

In developing his detailed mathematical models he contends that upon retirement and at all subsequent ages, optimum gross learning is set equal to zero. This follows from the fact that embodied knowledge has no value after working life ends, but accumulation is always costly. Certainly no investment option is chosen in the last year of working life since only zero returns can be obtained on it. (pp. 200 and 210-11)

This view of human capital creation as an activity undertaken primarily if not solely by the young, or by individuals while employed, is a reflection of how our society views people and in the way we approach national income accounting. Our society values people by what they do, whether they are productive, how they contribute to the nation's gross domestic product. GDP, a measure of the total value of all goods and services produced, was developed in the 1930s and is used as a measure of a society's economic well being. In calculating GDP, activities which fail to afford wages or salary are not accounted for because individuals in our society are graded by what they contribute to collective material power, failure to produce goods and/or services which result in the earning of wages or salary results in being dropped out and being treated as irrelevant. To be retired in America is, according to Marc Friedman as well as many others, to live life in abeyance. If we are viewed as only being productive if we are employed for pay outside our homes, if we fail to recognize the possibility of being engaged in unpaid productive activities, then of course retirement is a stage of life when one becomes, from a productively perspective, invisible. But it is so only by definition, by what we view as productive.

We tend to assume that the retired are content to engage in activities which have little or nothing to do with whatever it is that they engaged in prior to retirement; travel, gardening, caring for

grandchildren, etc. After all, why would a retired person ever want to engage in the very same activities after retiring that he/she engaged in prior to retirement given that no wage or salary is to be obtained from such activity? To pose such a question is to presume that individuals will only willingly engage in activities which provide them with salary and wage income, that they would never, for example, invest in schooling unless it resulted in maintaining or increasing wage and salary income. Retired persons, looking forward to no such earnings, are assumed to be devoid of any desire to actively retain, let alone enhance whatever it is they may have created and possessed prior to retirement. For my part, I assume self-image or identity, a concern to retain and/or enhance the way we feel about ourselves as well as concern for recognition by others, is a universal trait and that self-image or identity, as Akerlof and Kranton have recently noted, is associated with the social environment, with the social categories within which one is concerned to 'fit.' For academics the relevant 'social category' may be 'teacher', 'administrator', 'mentor', 'writer', 'researcher', 'publisher', etc.

Retired people may be motivated to retain, enhance and utilize their accumulated human capital in order to maintain and/or affirm their sense of self and the respect of their colleagues. This may serve as a much stronger incentive than the desire to secure a monetary return on an investment for retired people to retain and continue utilizing their human capital. Furthermore, once retired, forgone income often falls to zero and one has little or no disincentive to invest time and effort to maintain and enhance human capital. Whether there need be significant out-of-pocket cost to doing so is an empirical question. Certainly government, educational and other institutions have it in their power to mitigate any such costs. In fact, our current tax laws permit writing off costs incurred in developing, attending and presenting papers at professional conferences, taking relevant courses, purchasing books and journals, etc. when undertaken by the retired and non retired alike.

As reported in *The Economist*, according to Peter Warr of the Institute of Work Psychology at Sheffield University:

physical strength clearly declines with age. So, too, do some cognitive abilities. Older workers perform worse than younger ones in tests of working memory and the ability to process complex new information rapidly. However, declines in such capabilities are not crucial...especially in a service based economy. What matters in today's workplace is the mix of skills, experience and character that individuals bring to bear. Older workers are generally as good as younger workers. (pp. 53 - 54)

In an interview by Samuel Weiss of Jonathan R. Cole, Provost of Columbia University and carried in *The New York Times*, Cole noted that chronological age is not always a good indicator of research and teaching ability; some of the most cherished members of our faculty are older than 70. But,...new ideas and new perspectives more often than not come from younger faculty members. (p. 2)

Gillam and Shoven find that, " Faculty who achieve tenure at research universities are highly autonomous individuals who are devoted to scholarship and research in their disciplines. There is no pre determined end to one's scholarship". (p. 59)

As Jay Parini notes:

The retired professor holds a great treasure: experience. Its the kind of thing that only trial and error can produce. The wisdom and institutional memory that old heads carry are desperately needed by younger faculty members, who should not have to continuously reinvent the wheel. Forgetting is the easiest thing in the world to do, and the hardest to recover from. (p. 42)

Those charged with the task of producing, synthesizing and diffusing know-how are society's scholars, its academics. Assuming that the will and ability to contribute does indeed exist among retired academics, which is an empirical question, to allow the knowledge of how to produce, synthesize, diffuse to deteriorate, to languish, that is, the human capital of retired academics, is both wasteful and counter productive.

The way in which economists and others view the impact of aging and retirement on the retention and utilization of human capital differs appreciably and raises a number of questions which must ultimately be settled empirically; they cannot be resolved by theoretical fiat. My objective is to provide at least some of the necessary empirical content needed to determine the objective functional relationship between human capital retention, utilization, enhancement, aging and retirement with specific application to retired academics.

### ***METHODOLOGY & QUESTIONNAIRE:***

Human capital, certainly as applied to the professorate, is a multidimensional construct. Faculty at colleges and universities engage in a variety of pursuits and activities and over their employment life are exposed to and develop a myriad of task and area related expertise. This includes research and research related activities (publishing, delivering conference papers, editing and reviewing the work of others, writing grant applications and obtaining research project funding, organizing and/or chairing conferences, serving as consultants, etc.); lecturing, developing and redeveloping courses; serving in administrative positions at their institutions; chairing and serving on various committees; mentoring students including reading of dissertations, dissertation proposals, fellowship applications, writing recommendations, and mentoring fellow faculty; serving as expert witnesses, etc. This paper is restricted to a presentation and discussion of the research, research related, course development and teaching activities data.

I crafted and mailed a questionnaire to a randomly selected sample of retired faculty whose names I drew from lists obtained from various colleges and universities. I tried to use a stratified random quota sampling scheme to select schools from The Carnegie Foundation's, Classification of Institutions of Higher Education, for inclusion to obtain broad geographic and institutional type coverage. Unfortunately, because of privacy issues and in house regulations, many of the institutions approached were not able or not willing to make the names and addresses of their retired faculty available to me. Therefore my coverage is much more restricted than what I envisioned or desired. Since this survey is based on an opportunistic sample and self reported data (Becker & Watts, p. 447), I have no way of knowing the extent to which the respondents are representative of either their individual institutions or of the overall universe of retired faculty.

Lists of retired faculty with last known address were obtained from Ohio State, The University of Massachusetts (Amherst, Boston, Lowell and Dartmouth), Connecticut College and The California State College System (San Francisco State, Sacramento State, Hayward, Fresno, Humboldt, San Diego, Northridge, Fullerton, San Jose, Longbeach, California Polytech, Los Angeles, Chico and Sonoma).

Lists of retired faculty with last known address were obtained from two Public Research I Universities, one Public Doctoral II University, sixteen Public Masters I Universities and one Private Baccalaureate I Liberal Arts College. Names of participating schools will be made available to bona fide research scholars upon request.

Five of the institutions provided name, address, rank, department and date of retirement; one supplied name, address and department; thirteen provided only the name and address of their retired faculty. In mailing the questionnaire, I sought to limit recipients to those who had retired five or more years ago to insure that the respondents would have had appreciable retirement experience. Given the absence in the lists submitted by some of the institutions of date of retirement I had to discard a number of responses obtained. Also, none of the schools contacted indicated the gender of retirees and I was left to infer that information by noting the names of respondents.

The questionnaire was pre tested and adjusted in response to comments received from various retirees. In crafting the questionnaire I tried to take into consideration what has been pointed out by Bertrand and Mullainthan among others, namely that the way questions are ordered can substantially affect answers; that the way questions are worded can affect answers and that respondents may not exert much effort to recall relevant information. I am also aware that memory can be distorted by time, that we may romanticize and embellish what we did in the past when we try to remember today. Not too many of us, for example, are likely to fess up to not having enjoyed our students, our colleagues or the day-to-day work which was expected of us, that the only thing we really enjoyed about our academic position was that it demanded relatively little of us, paid a relatively good salary and evoked a certain respect and deference from others. Of course there are others who do recall clearly what they liked and disliked about academia. Hopefully, the vast majority of those who responded to my questionnaire belong in the latter group.

The totality of names submitted by the various institutions (universe of names) as well as the mailings and receipt of useable questionnaires varied as follows:

<b>Institution returned</b>	<b>Names submitted</b>	<b>Sample %</b>	<b>Percent of sample</b>
Baccalaureate	160	36.3	13.8
Masters I	2908	13.7	14.1
Research I & Doctoral II	1881	18.6	22.3
Totals and averages	4949	16.3	17.6



Eighty questionnaires were returned because of a wrong address or expired forwarding address or incapacitation or death of the recipient. These questionnaires were remailed to other retired faculty and are included in the sample statistic.

## ***DATA PRESENTATION & ANALYSIS:***

### **Retirement and Research Productivity:**

Pre- and post- retirement activities play a central role in this analysis, serving, in part, to define the use to which academic human capital has been and continues to be applied. I assume that what a retired academic found to be most enjoyable prior to retirement and the reason given for retiring may influence the extent to which one remains actively engaged in research and research related activities after retiring.

I constructed a summary measure reflecting pre- and post retirement research activity. I combined articles, books, consultancies, conferences, etc. by weighting the various activities since it is obvious that a book and an article or an article and a conference paper do not represent equivalent utilization of ones human capital. After communicating with a number of colleagues regarding the weights that might reasonably be assigned to the variety of research products and activities, it soon became obvious that no meaningful standard exist for assigning such weights. What is important here is that one be consistent in the application of weights, regardless of the weighting scheme selected. With this in mind, I decided to employ the following weights in constructing a summary measure of pre- and post retirement research and research related academic activity:

One book or co-authored book = 4 articles; one conference organized or one monogram or bulletin authored = 2 articles; one edited/ co-edited journal or book, one funded project, one consultancy, one co-authored article, one chapter in a book, one film, video, exhibition or workshop, each is treated as equivalent to 1 article; one conference paper, one book review = 1/2 article; one reviewed article = 1/4 article.

Fifteen of the one hundred forty-two respondents (10.6%) did not provide adequate information to permit quantifying their pre and post retirement research and research related activities. Eighty of the one hundred twenty-seven respondents who provided useable data (63%), utilized their research and/or research associated skills to some extent in both pre and post retirement .

The numerical values recorded in Table 1 were obtained by employing the weights noted above to individual research and research related activities which each respondent stated he or she had completed during his or her pre and post retirement, summing the resultant series for each individual and dividing the results by the number of years each respondent had been employed as a full time academic and the number of years each respondent had been retired. I then calculated the ratio of each respondent's post to pre retirement research activity. The resultant statistic is a measure of post retirement research productivity as a proportion of pre retirement productivity. A figure of 1.00 here would indicate that the respondent had been as research productive during his or her post retirement as he or she had been prior to retiring.

According to my data, the production of articles, books, monographs conference papers, etc. by the eighty respondents after retiring from their academic positions, was almost three quarters as great (74%) as when they were fully employed, that is, prior to their retirement. Seventeen of the eighty, 21.25%, were more productive, produced more research and engaged in more research related activities per year after retiring than they had completed per year while employed. Forty-four of the respondents (55%) were less than half as productive after retiring. Why these eighty continued to engage in research and research related activities after retiring; why some of the retired became more productive after retiring while others became less productive, are questions I will address in future papers.

Before leaving the topic of retirement and research productivity it is worth looking a bit further at the forty-seven retirees (37%) who noted that they had engaged in no research or research related activity after retiring. Table two records two of the possible explanations for their decision not to engage in post retirement research activities, namely why they retired and the activity they most enjoyed prior to taking retirement.

Loss of interest in continuing on as a full-time academic and ones own or ones mate's health were the primary reasons cited for retiring by 61.7 percent of all those who did not engage in any research activity after retiring. No one in this group cited a desire to concentrate on research as an explanation for their choosing to retire.

Undergraduate teaching was the most often noted activity enjoyed by the respondents during their pre-retirement time as an academic, accounting for 59.6% of all responses received. Interestingly, the second most cited activity enjoyed was research, by 14.9%, which was statistically no different from graduate teaching. Teaching, undergraduate and graduate students taken together, accounted for 72.3 % of all of their responses to this question.

How might we begin to explain the professed enjoyment in engaging in research and research related activities while employed that seven of the respondents noted and the lack of any such activity on their part after retirement? Reasons given for taking retirement afford at least a partial answer. Four of the seven respondents who stated they had enjoyed research the most while employed also noted that they had decided to retire because they had lost interest in remaining as an academic. One had retired because of a desire to develop a new, non-academic interest such as gardening, photography, etc.; one retired because federal law mandated retirement and one retired to accept a proffered 'golden handshake'. Even though all seven of these retirees had enjoyed research and research related activities while employed as an academic, none of them noted a desire to concentrate on research after retirement as an explanation of why they had retired.

With respect to retirement and research/research related activities, the data indicates that retirement is not a wasteland, devoid of creativity or intellectual activity.

Most academics continue to be intellectually engaged and remain involved in the kinds of research and research related activities that sustained them during their pre retirement careers and which resulted in promotions, academic honors, collegial applause and increased salaries. Little if any such acclaim is afforded the retired and productive academic.

## ***Retirement, Aging and Research Productivity:***

Unfortunately, very few have seen fit to empirically investigate the relationship between retirement, aging and productivity. Among the few who have done so are Hammond and Morgan, 1991, Diamond, 1986 and Hamermesh, 1994.

According to Hammond and Morgan:

With respect to the general population, the available studies that followed a given group of people over time found that there was little decline in mental ability until age 60, after which the decline is slight until the middle 70s with the rate of decline possibly increasing again in the early 80s. With respect to the range of abilities that make up faculty quality, employing student evaluations to measure teaching ability and counting number of publications weighted by quality of journal, little if any evidence was found to indicate any significant relationship between age and deterioration in either teaching or research activity. Based on this review of the literature, as well as personal experience, it is clear that measures of research activity show no strong relationship with age. Moreover, studies have not shown a clear decline of teaching ability with advancing age. In scholarship and in teaching, individual variance is greater than any average tendencies to decline. An older faculty member who performs less well than he did a decade earlier may nevertheless perform at a higher level than a colleague a decade or more younger and thereby contribute as much or more to an institution's reputation for quality. (p. 58)

Diamond and Hamermesh also employed data on publications appearing in leading journals or the number of times articles appearing in leading journals have been cited as indicators of productivity. They report finding that productivity among economists, mathematicians and physicists declines very sharply with age. But their definition of what constitutes human capital productivity as well as the universe from which they draw their data (faculty at UC Berkeley and the University of Illinois in Diamond's study), leaves much to be desired.

The data obtained from retired faculty who taught at and retired from twenty different colleges and universities permits measuring the impact that retirement and aging has had on the research productivity of retired academics, where research productivity is defined in very broad and inclusive terms. Research productivity as I apply the term, includes publication of articles, books, monographs and bulletins by oneself or as a co-author, editing or co-editing journals and books, producing chapters in books, book reviews and reviewing articles, organization and/or presentation of conference papers, obtaining funding for research projects, consultancies, and making and presenting films or videos. Employing the summary measure of academic research noted above, I tried to determine the impact of aging in retirement on research productivity.

Eighty-one of the one hundred forty two respondents (57%) noted that they had engaged in some research activity while retired. The number of years retired for this sample of academics ranged from five to twenty years.

Fitting a linear least-squares best fit trend line to the data, where research productivity is a function of number of years retired, I obtained the following equations:

For the entire 5 - 20 years retired;  $y = -0.141x + 3.290$ ;

5 - 13 years retired;  $y = -0.131x + 3.162$ ;

5 - 9 years retired;  $y = -0.122x + 3.164$

With the passage of time spent in retirement, this indicates that research productivity declines by 12 to 14 percent per year and that this rate of declining productivity does not vary significantly by shortening the time spent in retirement. At this rate of decline, 14%, it would require thirty-three + years in retirement before research productivity fell to zero. This does not seem to be in accord with what most of the authors noted had in mind regarding the impact of retirement on human capital retention and utilization. Before placing much emphasis on this finding, or accepting the proposition that aging in retirement exerts a significant and continuous negative impact on research productivity, note that the coefficient of determination  $R^2$  was only 0.401 or 40.1 percent. That is, the regression model only explains about 40.1 percent of the variation in the time - research productivity relationship. There is little or no association between time passed in retirement i.e., aging, and research productivity. Much more is involved in explaining how research productivity varies over time than the mere passage of time itself.

### ***Retirement and Teaching:***

Fifty-one of the one hundred twenty-seven respondents (40%) who provided adequate information reported having engaged in some teaching/course development activity since retiring. The number of courses taught and/or developed by these fifty-one retirees varied between 1 and 10, the average being 2.8 with a median of 5.5. Forty-six of the fifty-one also provided adequate information to permit calculating how many years into retirement they had continued to teach and/or develop courses.

The time spent in retirement by the forty-six retired academics varied between 5 and 26 years, with a mean value of 9.8 and a median of 15.5. They spent between 1 and 12 years teaching, averaging 4.3 years, with a median of 6.5 years. By dividing the number of years retired by the number of years each had taught while retired, I obtained the proportion of time each retiree had spent engaged in teaching and/or course development. Table 3 summarizes my findings.

The forty-six spent an average of 47.7% of their time as retired academics engaged in teaching and the range over the entire set being 3.8 percent to 100 percent. Twenty-two percent of the forty-six devoted eighty percent or more of their retirement to engaging in some teaching. Whether this does or does not suggest an appreciable involvement by retired faculty in course teaching and/or development is of course a matter of judgment. Furthermore, lest it be assumed that engaging in teaching and teaching related activities while retired served as a substitute for undertaking research and engaging in research related activities, note should be taken of the fact that thirty of the forty-six respondents (65%), reported having had some research involvement, producing, on average, 2.6 articles or article equivalents each year of retirement. They were, on

average, three-quarters or 75% as research productive in retirement as they had been while serving as full-time employed academics. What may also be of some interest is that of the seventy-six academics who reported that they had not engaged in any teaching or course development activities after retiring, seventy-four percent noted that teaching was their most enjoyable preretirement academic activity.

### ***Retirement Year and Age at Retirement:***

All 142 of the respondents retired between 1969 and 1998. Sixty-three (44.4%) of the respondents retired before 1994. Having this information as well as the age at which each respondent retired facilitates commenting upon recent work regarding the impact of changes in the federal law mandating retirement that went into effect at the end of 1993.

This change in federal law annulled the requirement that academics were required to retire by the year in which they celebrated their 70th birthday. Both preceding the enactment of this change and subsequent to it, appreciable work has been undertaken to determine the impact this legislative change might have on retirement age. The most recent work in this area of which I am aware is a study by Ashenfelter and Card completed in July of 2001. They found that for all academic institutions, there was very little age difference to be found in pre- and post-mandatory retirement but that there was a significant difference by type of institution. The age of retirement tended to go up without the imposition of any mandated retirement age at private research institutions and also, but less significantly so, at public research and non-research universities. (pp. 976 -78).

Table 4 records the data obtained from the respondents to my questionnaire regarding the distribution of retirement year and the age at which retirement was taken for those retiring both prior and subsequent to the lifting of mandatory retirement.

Prior to ending mandated retirement, the average age at retirement was 63.5 years. From enactment of the federal law ending mandated retirement, the average age at retirement obtained from my sample was 64.6 years. This suggests that this legal change exerted little or no impact on faculty decision-making regarding when to retire. But delving a bit further, I found that while only 15.9 percent of those who retired prior to 1994 were 68 years or older, the equivalent statistic during the post mandatory age of retirement period was just about twice as large or 31.6%. Also, faculty who continued on in academia past their seventieth birthday accounted for 10.1% of all those who retired after mandatory retirement ended. The mean year of retirement statistic appears to hide more than it reveals and indeed the change in federal law does seem to have made a significant impact on the graying of university and college faculty.

Analysis of retirement age by type of institution will appear in subsequent papers. But before leaving this issue, because the data permits doing so, it is worth looking at the efficacy of educational institutions employing 'golden handshakes' to encourage the taking of retirement on the age at which retirement occurs. Such 'handshakes' usually involve crediting the perspective retiree with additional years of active service so that pensions will be increased and/or offering retirees the opportunity to continue teaching after taking retirement. In some cases, a cash bonus may be included as part of the 'golden handshake' package.

Thirty of the one hundred thirty-eight retirees who indicated why they had retired (21.7%) stated that they had done so because they had been offered a 'golden handshake'. The age range of those who were offered and accepted this 'handshake,' was 52 - 69 with a mean age of 63.3. Eleven of the 'handshakes' (36.7%) were taken by those members of faculty who retired prior to 1994 and their average age at retirement was 63.5. Of those who accepted the handshake offer in 1994 and thereafter, their average age was 61.8. If the objective of the institutions offering 'golden handshakes' was to rid themselves of their older and often assumed less productive faculty, especially after mandatory retirement ended, this approach would appear to have been rather inefficient and misdirected.

### ***Conclusions:***

Many economists, especially those who have crafted human capital models, appear to view retirement as marking a dead end to productive involvement in society. With regard to academics, this feeds into the assumption that retirement must result, for the vast majority of retired academicians, in an end to both research and to teaching. With regard to research activities, according to the data as presented, the production of articles, books, monographs conference papers, etc., by a majority of the retired academics who responded to my questionnaire, a very different picture of life among retired academics emerges. After retiring, their research and research related productivity was almost three quarters as great (74%) as when they were fully employed. An appreciable number of the retired academics actually became more productive, produced more research and engaged in more research related activities per year after retiring than they had completed, per year, while employed.

With respect to the impact aging may have on research productivity, findings at this stage of my analysis are inconclusive. While there does appear to be some deterioration in productivity as aging occurs, aging by itself does not appear to hold great promise in explaining the observed deterioration in research productivity. Much more in the way of both data and analysis is needed before any reliable conclusion is offered.

As for teaching and developing new course materials, forty percent of those who provided adequate information reported having engaged in some teaching/course development activity since retiring. The number of courses taught and/or developed varied between 1 and 10, the average being 2.8. Furthermore, the time spent in retirement by those who continued to engage in teaching was, on average, just a shade shy of ten years (9.8 years), with teaching and course development activities being spread over almost half that time (45.9%). I also found that engaging in teaching and teaching related activities did not serve as a substitute for undertaking research and engaging in research related activities for a significant number of retired academics, thirty of whom reported having had some research involvement, producing, on average, 2.6 articles or article equivalents per year of retirement. They were 75% as research productive in retirement as they had been while serving as fully employed academics.

Far from marking the end of scholarly activity, retirement is, for most of those who responded to my questionnaire, a time to continue doing what they had been trained to do and learned to appreciate during their years as full time members of faculty. They had, with some exceptions, neither chosen to slide into dotage nor to allow their accumulated human capital to deteriorate or

disappear. Those of us, economists who work in the area of human capital creation and utilization need to reconsider our approach to and treatment in our theoretical models of aging, retirement and productivity. This might best be done, as a start at least, by reconsidering the way in which we define and quantify productivity in national income accounting.

I also looked at the impact of ending mandatory faculty retirement and found that while the average age of retirement did not change with the demise of mandatory retirement, the number of faculty who stayed on past the age of 68, as well as those who continued working into their 70's, increased markedly. Furthermore, I discovered that attempts made by schools to encourage earlier retirement by offering 'golden handshakes' had generally failed to encourage their older faculty to 'shake hands'.

## APPENDIX 1

TABLE 1  
COMPARATIVE RESEARCH AND RESEARCH RELATED  
PRODUCTIVITY PRE AND POST RETIREMENT

<b>Comparative Productivity</b>	<b>Number of Faculty</b>
0-0.10	8
0.11-0.20	10
0.21-0.30	8
0.31-0.40	13
0.41-0.50	5
0.51-0.60	6
0.61-0.70	4
0.71-0.80	3
0.81-0.90	4
0.91-1.00	2
1.01-2.00	10
2.01-3.00	5
3.01-over	2
Range: 0.01 - 5.57	Mean: 0.74



TABLE 2  
 REASONS CITED FOR RETIRING AND ACTIVITY MOST ENJOYED  
 PRIOR TO RETIREMENT BY RETIREES ELECTING NOT TO UTILIZE  
 THEIR RESEARCH AND RESEARCH RELATED HUMAN CAPITAL

<b>Number</b>	<b>Reasons for Retiring</b>	<b>Number</b>	<b>Activity Enjoyed Most</b>
5	Ample time of service	28	Undergraduate teaching
21	Loss of interest	6	Graduate teaching
8	Health of self or mate	7	Research
1	Desire to relocate/travel	1	Student advising
4	Pursuit of a new interest	1	Administration
2	Mandatory retirement	3	Colleagues
5	Golden Handshake	1	No response offered
1	Changed dept./students		

TABLE 3  
 RETIREMENT TIME DEVOTED TO TEACHING AND/OR NEW  
 COURSE DEVELOPMENT

Number of Retirees	Years Retired	Years Taught	B/A
	A	B	%
3	5	2.3	46.0
6	6	4.3	71.7
2	7	2.0	28.6
13	8	4.0	50.0
4	9	3.25	36.1
1	10	4.0	40.0
7	11	5.4	49.1
1	12	7.0	58.3
4	13	5.0	38.5
1	14	1.0	7.1
1	15	9.0	60.0
1	20	3.0	15.0
1	21	2.0	9.5
1	26	1.0	3.8

% of retirement time devoted to teaching: weighted average, = 45.9%

TABLE 4  
YEAR, NUMBER RETIRING AND AGE AT RETIREMENT

<b>Year</b>	<b>Number</b>	<b>Average Age</b>	<b>Range</b>
1969	1	60	-
1976	1	65	-
1982	1	60	-
1983	3	64.3	64-65
1984	1	63	-
1985	2	65.5	62-69
1986	1	64	-
1987	2	65.5	65-66
1988	5	64.8	59-70
1989	1	63	-
1990	6	65.5	63-68
1991	7	65.4	57-70
1992	28	64.4	57-70
1993	4	65.3	62-70
Sub-total: 63		Mean: 63.5	Range: 57-70
1994	18	65.3	56-71
1995	24	62.7	52-72
1996	13	65.1	61-73
1997	12	64.8	60-70
1998	12	66.8	62-77
Sub-total: 79		Mean: 64.6	Range: 52-77

## APPENDIX 2

### QUESTIONNAIRE

Please note: Retirement begins when you stop full time employment. If you accept early or some other form of retirement and move to another full time position, then for purposes of this study you are NOT as yet retired.

Name: \_\_\_\_\_ Age: \_\_\_\_\_  
Department: \_\_\_\_\_ School \_\_\_\_\_  
E mail: \_\_\_\_\_ Year and Month Retired: \_\_\_\_\_  
Terminal Degree: \_\_\_\_\_ Year Conferred: \_\_\_\_\_

Year of First Full Time Academic Appointment: \_\_\_\_\_

Number of Years of Full Time Employment in Academia prior to retirement: \_\_\_\_\_

Please order the activities that provided you with the greatest sense of accomplishment in academia (1 = Most fulfilling):

undergraduate teaching\_\_\_\_\_

graduate teaching\_\_\_\_\_

research\_\_\_\_\_

student advising\_\_\_\_\_

serving on committees\_\_\_\_\_

administration\_\_\_\_\_

interacting with colleagues\_\_\_\_\_

other (please explain)\_\_\_\_\_

WHY did you retire? Was it, for example, because you wanted to focus on some particular aspect of academia, i.e., research; pursue other interests; because you lost interest in academic life; own health or health of another; etc.?

Also, have your interests changed since retiring, are you now interested in doing other things than what you thought of doing when you first retired?

PART 1. PRIOR TO RETIREMENT:

Number of undergraduate courses developed:

Number of graduate courses developed:

Administrative positions held and dates:

Committees chaired/organized and dates:

Number of publications/equivalent creative works and most recent year:

Articles\_\_\_\_\_

Books\_\_\_\_\_

Co-authored books\_\_\_\_\_

Chapters in books\_\_\_\_\_

Journal issues edited\_\_\_\_\_

Co-authored articles\_\_\_\_\_

Consultancies\_\_\_\_\_

Funded research projects\_\_\_\_\_

Presentation of conference papers\_\_\_\_\_

Conferences organized/Chaired\_\_\_\_\_

Works in film or video\_\_\_\_\_

Articles reviewed\_\_\_\_\_

Other (please explain)\_\_\_\_\_

Exhibitions\_\_\_\_\_

PART 2. SINCE RETIREMENT:

University service:

Undergraduate and/or graduate courses developed/taught with dates:

University/College/ Department Committee service (Senate, Doctoral, Hiring, Tenure and promotion, Advisory, Fund raising, etc.) with dates:

Student mentoring/advising:

Mentoring of faculty on teaching/preparing course syllabi:

Mentoring faculty on preparing/submitting research proposals:

Invited guest lecturer with dates?

If invited to do so, which of the activities noted above would you have agreed to undertake?  
Please note if you would require monetary compensation for such activities.

Research and Publications Since Retiring:

Number of publications/equivalent creative works and most recent year:

Articles\_\_\_\_\_

Books\_\_\_\_\_

Co-authored books\_\_\_\_\_

Chapters in books\_\_\_\_\_

Journal issues edited\_\_\_\_\_

Co-authored articles\_\_\_\_\_

Consultancies\_\_\_\_\_

Funded research projects\_\_\_\_\_

Presentation of conference papers\_\_\_\_\_

Conferences organized/Chaired\_\_\_\_\_

Works in film or video\_\_\_\_\_

Articles reviewed\_\_\_\_\_

Other (please explain)\_\_\_\_\_

Exhibitions\_\_\_\_\_

Are you conducting research in a new field? Please explain and provide dates.

Access:

After retiring, did you or do you continue to have the following: (please note dates):

University office space?\_\_\_\_\_

Computer support\_\_\_\_\_

Secretarial services\_\_\_\_\_

Laboratory space\_\_\_\_\_

University research funding\_\_\_\_\_

Student research support\_\_\_\_\_

Research grants from other sources\_\_\_\_\_

Community service:

Please specify:\_\_\_\_\_

Other:

Have you managed to keep up with developments in your field?

If so, how?

Reading\_\_\_\_\_ Personal contact with colleagues\_\_\_\_\_

Attending meetings\_\_\_\_\_ Internet and e-mail\_\_\_\_\_ Other ways (please explain)

What IMPACT, if any, has retirement made on the utilization and maintenance of your experiences as an academic, that is to say, on your HUMAN CAPITAL?

Some may feel that retirement has endowed them with a Guggenheim, an opportunity to do exactly what they want to do without any hassle; others may feel that they have been abandoned by their university, that their colleagues could hardly wait to see their backside. How do you feel?

Thank you for having taken the time to complete this questionnaire. Please let me know if you would like to receive a copy of my findings.

gershenberg@aol.com

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