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Gary Becker's early work on human capital – collaborations and distinctiveness

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Abstract

In a prolific and illustrious career, the late Gary Becker (1930–2014) developed what he would later call "the economic approach to human behaviour". One of the most significant strands of that research was that which focused on human capital, occuping a significant part of his career, especially in his early years. In this paper we will focus on Becker's early work in human capital up to the publication of his book in 1964, a period that laid the foundations for his career and in which he tested the possibilities of (and the resistance to) this economic approach to human behaviour. We will explore the context in which the book was developed and the interactions with other people that were laying the foundations for human capital research, namely those working at the Chicago and Columbia Departments of Economics.

JEL codes: B2; B3; I2; J3

Keywords: Human capital; Gary Becker; Chicago; Columbia; History of economics

1 Introduction

In a prolific and illustrious career, the late Gary Becker (1930–2014) developed what he would later call "the economic approach to human behaviour"[2]. This, which he considered to be a method of analysis rather than an assumption about human motivations, became an attempt to explain various facets of human behaviour through a set of simplified assumptions regarding human behaviour, a result of individual choices characterised by utility maxixmisation, a forward-looking stance, consistent rationality, and stable and persistent preferences (Becker 1976). Those choices were constrained by income, time, imperfect memory and calculating capabilities, and the opportunities available (Becker 1993). Although he often mentioned that non-economic forces also played a role in terms of human behaviour, he believed that rational choice theory provided a unifying approach to the analysis of multiple social issues, and not only market behaviour (see, for instance, his Nobel Lecture in Becker 1993). Moreover, the scope of non-economic factors became less prominent since in his later work, rationality broadened to cover aspects such as habits, culture, and social interactions in his attempt to provide an economic rationale for those non-economic factors.

One of his most significant strands of research was that which developed human capital, occuping a significant part of his career, especially in the early years. His research led to the publication of the book *Human Capital* (Becker 1964), which was a major step in establishing Becker's reputation in economics and beyond. In this paper we will focus on Becker's early work on human capital up to the publication of his

book in 1964, a period that laid the foundations for his career and in which he tested the possibilities of (and the resistance to) this economic approach to human behaviour. We will explore the context in which the book was developed and the interactions with other people that were laying the foundations for human capital research, namely those working at the Chicago and Columbia Departments of Economics.

Becker's work on human capital is not only the most significant work of his first decade of research, but it also contains some of the hallmarks of his subsequent work underlying those developments[3]. In the next section, I start by laying the context in which Becker became interested in human capital as a topic of research. Then I present Becker's early work on human capital and the development of the NBER study that supported it. In the fourth section, I present the major themes of the book and the way it organised human capital research developed thus far. In the fifth section, I analyse the reactions to the book, and in the sixth section, its subsequent exploration by the network of early human capital researchers. Finally, in the seventh section, I will conclude, notably by highlighting the significance of Becker's work on human capital in the context of his subsequent career.

2 The development of human capital research in the 1950s

The idea that education can provide benefits, including economic ones, is certainly an old one. However, the use of metaphors such as human capital or human wealth to portray the economic effects of education and training only started to be developed into a coherent research program by the late 1950s. Most pre-WWII economists traditionally regarded the benefits of education as being concentrated at the political and moral level rather than at the economic level, and they tended to ignore the role of education in their reflections. Despite some grand rhetorical statements on the importance of education for the individual and society as a whole, the truth was that education was a peripheral issue when it came to the analysis of economic phenomena, notably in terms of the labour market[4].

In the post-war years, there were signs of an increasing familiarity with human capital and the economic value of education among academic economists. Allan Fisher (1946) emphasised the economic dimension of educational policy and the need to consider education as an instrument of economic policy[5]. He considered that in the past, human progress had "been too much handicapped by neglect of our human capital" (1946a, 6), visible in "the limitations of imperfect systems of education" (1946a, 7), creating bottlenecks in the economic process due to the scarcity of skilled labour. This could be partly explained by the fact that education was a long-term investment, the benefits of which took some time to become visible. Education could play a decisive role in the post-war reconstruction by restoring the productive structure if more resources were devoted to the equipment and development of human resources. The priorities should include universal primary education and the training of workers[6]. Education should be privileged because it not only improved the efficiency of the human factor, but it also improved the equality of income distribution.

In fact, there were signs that the expression 'human capital' was becoming more common among academic economists from the 1940s onwards. Although still small, the number of references to it in major economic journals between 1940–1955 is greater than in the previous fifty years. The visibility was helped by the fact that some of the

authors were prominent figures in the discipline. Roy Harrod (1943) used it in his discussion about unemployment and subsistence, suggesting that unemployment could lead to an obsolescence of human capital. Frank Knight (1941) used it in his discussion about economic freedom and (human) capital accumulation. Kenneth Boulding had several references to human capital in an article on income and welfare (1949). Milton Friedman (1943) used it in two articles, one in the context of the wartime and post-war fiscal policy and the other in his well-known article on choice, chance and personal income distribution (Friedman 1953). Joseph Spengler (1950, 1955) had several references to human capital in some of his articles on the qualitative analysis of population. The variety of topics in which human capital was used was also increasing, and there are further references in the context of development and trade, classical political economy, and warfare topics.

These signs of increasing interest would also benefit in the latter part of the 1950s from the attention given by a group of economists institutionally or intellectually linked with the University of Chicago's Department of Economics. From the early 1950s onwards, T. W. Schultz, then the Head of the Department of Economics, would place the idea of investment in human capacities at the core of economic development[7]. A major contribution in this respect was his presidential address to the American Economic Association in 1960 (Schultz 1961). In this address, Schultz blended the results of his own research on the importance of education to private and social development with general statements of past economists, such as Alfred Marshall and Johann von Thünen, and the emerging results of younger academics, such as Jacob Mincer and Gary Becker, in order to present a concept of human capital that included five main categories: health, on-the-job training, schooling, adult education, and migration. This was nevertheless faced with significant resistance from the professional establishment of economics[8].

Schultz also played a crucial role in those early stages, coordinating and stimulating these efforts, especially through his skilled research stewardship. Some of the best examples of this capacity is exemplified by the set of volumes/conferences he organised on human capital themes, in particular the JPE supplement on 'Investment in Human Beings' (Schultz 1962). Schultz was a highly respected member of the discipline at that time with strong connections with many public and private funding bodies (especially the Rockefeller and Ford Foundations), and he would use those connections to raise the awareness of the importance of investments in human capital. He also used that visibility to give a voice to significant work that was being done by much less-known researchers in exploring human capital potential.

Another important contribution at that time came from Jacob Mincer, who was writing his PhD dissertation (finished in 1957 and published in a short version on the JPE in 1958). In his dissertation, Mincer developed what then became known as the "schooling model", which attempted to use human capital (education and training) as a major explanatory device for empirical findings such as a higher remuneration for occupations requiring more training and a more pronounced lifetime income pattern as a result of training on the job. A peculiar aspect of Mincer's initial work on human capital was that he developed it while largely unaware that other people were interested in turning human capital into an explanatory principle for several economic issues. Although Mincer initially started his graduate studies in Chicago, he then moved to Columbia for personal reasons and graduated there in 1957. Mincer and Schultz

interacted more closely when Mincer went to Chicago as a post-doctoral fellow (1957–8) after an invitation from Schultz. Mincer's short but intensive period at Chicago would provide him with important stimulus to explore further the relevance of human capital theory (in particular the role of on-the-job training) for lifetime income and income inequality, which led to important publications in the early 1960s (for more details see Teixeira 2007, 2011).

By the 1960s, human capital was gaining increasing visibility, and these developments would play a major role in Becker's increasing interest in human capital, notably through close interaction with some of the pioneers in the field, such as T. W. Schultz (his former professor at Chicago) and Jacob Mincer, with whom he would develop intensive collaboration throughout most of the 1960s. At the same time, Becker's contribution would significantly shape the development of human capital research, notably by providing it with important conceptual and theoretical tools. In the next section, I will analyse how Becker achieved this.

3 Between Chicago and Columbia - Becker's early interest in human capital

The fact that the application of economic theory to social issues was extremely unusual in the mid-1950s did not discourage Becker from pursuing these alleys from a very early stage. Despite a promising beginning in his academic career, he started to lose interest in economics when approaching the end of his BA studies at Princeton, mostly because it dealt less than he expected with relevant social problems, and he even considered a change to sociology. Eventually he decided to pursue graduate studies in economics at Chicago, which proved to be a turning point in his career, especially in his confidence in the ability of economics to deal with the so-called relevant social issues.

The intellectual environment at Chicago reignited in Becker an interest in economics that had faded at Princeton. Clearly influential during that period were Milton Friedman, with whom he took a course on microeconomics, Gregg Lewis and his analysis of labour markets using neoclassical economic theory, and T. W. Schultz, whose interest in human capital would be influential in Becker's subsequent work. Moreover, it encouraged him to pursue the application of economic theory to social issues, despite this being extremely unusual at that time[9].

His interest in developing different types of economic research would become very visible in his doctoral dissertation focusing on discrimination in the market place (Becker 1955). In this work, Becker analysed discrimination by using a neoclassical framework and producing quantified indications of the importance of this phenomenon, measured by what he called the 'discrimination coefficient'. This attempt was regarded with scepticism, especially due to his view of discrimination as a rational behaviour, though it benefited from the encouragement and influence of certain major figures of the Chicago Economic Department, in particular Gregg Lewis, his supervisor, and Milton Friedman, who nurtured Becker's confidence in addressing various social issues with standard economics. His thesis committee was chaired by Gregg Lewis and included Jacob Marschak, D. Gale Johnson, and William Bradbury (a sociologist) (Heckman 2011)[10].

In his doctoral dissertation, Becker devoted some attention to education in the framework of discrimination, especially labour market discrimination. He presented education as a tool to access qualified and better-paid occupations. However, the effectiveness of education in that regard depended on various factors, such as the incidence of self-

employment. In the cases where this was more significant (such as medicine or dentistry), its effectiveness was greater than in the cases, such as engineers, that were largely employed by the private sector. In the case of lawyers, the type of activity was also detrimental to non-white graduates, and education was less effective in sheltering workers against discrimination. Moreover, in his conclusions, he would point out that discrimination was greater against older and better-educated non-white workers, possibly due to the fact that these had higher and more responsible occupational positions. Given the expectation at that time that access to education would expand among non-whites, it was even more relevant to study the aforementioned phenomenon.

It is worth noting that though hardly using the expression "human capital", Becker clearly adopted an investment rationale when talking about education and training. Thus, when discussing the issue of differences in the quality of the education received by different ethnic groups, he would state that "non-whites with the same years of schooling have less capital invested in them through education and thus have less economic capacity. Capital invested through schooling surely accounts for a larger fraction of the income of those with much schooling than of those with little schooling" (1971, 111–112). Moreover, he discussed the combined effects of differences in quality of experience and education. Although he did not regard those as major factors in explaining income differentials, he still acknowledged their relevance[11].

Despite the controversial nature of these applications, which translated into hostility and indifference from many economists and other social scientists, Becker (1987) got some stimulus out of the reviews of his *Economics of Discrimination,* especially from the supportive environment of Chicago. Thus, he pursued his attempts to show the explanatory power of economics with his analysis of fertility (Becker 1960). With the growth of knowledge about contraception, Becker considered that there was a greater scope for decision-making as well as an increased importance in environmental factors. In this approach, children were regarded as a consumable and durable good, thus allowing the use of the theory of demand of consumer durables. Some of these issues would be pursued in more detail in his later work in the 1970s in the economic analysis of the family.

In the late 1950s, Becker moved to New York to teach at Columbia University and to start working at the NBER. Although he enjoyed the intellectual atmosphere at Chicago, and the Department was keen to keep him, he felt the need to experience other environments. The possibility of working at the NBER was also a major pulling factor. His initial project was to analyse the money rates of return at different levels of education, especially college education. The stimulus of T. W. Schultz and the interest and discussions within the Columbia Labor Workshop, especially his interaction with Mincer (who also moved to Columbia in the early 1960s), made him enlarge the scope of the project, and the work grew theoretically and empirically. Human capital was also an opportunity to further explore his interest in extending the application of economics to non-market behaviour.

An important inspiration was also Friedman's doctoral research on the income of professionals, which was published as *Income from Independent Professional Practice* by Friedman and Kuznets (1945). This work was started in 1933 by Kuznets as a by-product of the study of national income of the US for 1929–32 (and conducted by the NBER in collaboration with the US Department of Commerce). After some delays,

Friedman took the main direction of the project in 1937, rewriting much of it in a way that made it possible for him to submit it as his doctoral dissertation at Columbia University (cf. Hirsch and de Marchi 1990)[12]. His influence was particularly felt on the second section of chapter four focussing on the factors leading to differences in level of income, of which length of training was the first to be mentioned. The differences in income were regarded as either a compensation for longer periods of training, or due to possible disequilibria caused by restrictions on the free allocation of resources. These could reflect an unequal access to training and/or institutional interferences either by the government or by professional associations, which prevented earnings becoming more equal by restricting occupational decisions.

The analysis of the income of the professions indicated a wide variability of that income, much of it considered to be a compensatory effect of differences in length of training (Ibid., 83). This compensation referred to the direct costs of training and to the foregone earnings, though it had to be noted that it was a rough calculus due to the influence of other elements such as non-pecuniary factors, ability, and social and economic rigidities in the occupational structure (Ibid., 390–1). The role of ability was nevertheless played down as a significant explanatory force (Ibid., 237). However, the returns seemed to be well above the extra costs due to the lengthier training, suggesting the existence of access restrictions that were regarded as leading to under-investment in professional training. This was due to the peculiarities of a type of capital invested in people, namely the imperfections of the financial markets, since "the amount invested in professional training will depend less on expected returns than on the number of persons who have or can get the money to finance their training" (Ibid., 391)[13]. The analysis of Friedman, which would be an important inspiration also for Mincer's work (see his interview in Teixeira 2006; also Mincer's dissertation 1957), was an important stimulus for Becker, not the least due to Friedman's encouragement to explore innovative applications of economics. Altogether, these various motivations explain Becker's interest in studying human capital and its implications and also the way he would develop a distinctive approach to this emerging research programme.

4 The NBER study and the development of the human capital model

As we have seen, Becker had been since his graduate school years interested in applying economic theory to new topics or areas of human behaviour that were not normally analysed from a strictly economic perspective (meaning by using basic neoclassical price theory). In the late 1950s (1957), when Becker started work at the NBER, he decided to analyse the money rates of return to different levels of education, especially college. The stimulus of one of his mentors, T. W. Schultz, as well as the interest and discussions raised in the activities of the Columbia Labor Workshop, especially his increasingly close relationship with Mincer, made him enlarge its scope. In the following sections, I present the work developed by Becker by the turn of the 1960s and the way it was consolidated in his book in 1964. I also try to identify some of its major contributions that paved the way for important subsequent debates about the role of education and training in the labour market.

4.1 First instalments

The preliminary instalments of that work were presented at the annual conference of the AEA in 1959, one year before T. W. Schultz's presidential address on "Investment in Human Capital", and at the 1961 conference in Chicago on "Investment in Human

Beings", published in the special 1962 volume of the JPE and edited by Schultz. This congregated many of the pioneers in human capital research such as Schultz himself, Mincer, Selma Mushkin, Larry Sjaastad and others.

The paper presented at the AEA annual conference was a first report of what was then a Carnegie study of rates of return to college education. In the acknowledgements, we find the expected names of T.W. Schultz and J. Mincer as well as Zvi Griliches, Solomon Fabricant and Arthur Burns. The motivation of the text was linked to the fears of underinvestment in college education in the aftermath of the so-called 'Sputnik shock'. In his text, Becker focused on the investment in and returns to education, especially at the college level, spending a significant amount of time discussing the conceptual delimitation of the costs and benefits associated with the calculus of those rates of return. One important issue already raised at this occasion was the variability of those returns for high school and college graduates, even for individuals with similar IQ and grades. Becker raised the hypothesis that a significant part of that variance was related to the quality of those investments and therefore to an imperfect measurement of the amount invested by each individual.

In the coming years, the work would develop significantly, as becomes clear by the paper presented at the conference organised by T. W. Schultz on "Investment in Human Beings" held in late 1961 in Chicago. This was contributed to significantly by the close interaction with Mincer and with other participants at the Columbia Labor Workshop as well as Becker's dissatisfaction with the existing analytical structure for the study of investments in human capital. The paper presented on that occasion constitutes the gist of the (future) book's theoretical chapters. Although the paper devoted little attention to the presentation of empirical results, for Becker it was precisely the possibility of providing a unified explanation to several empirical phenomena (presented mainly as illustrations in the last section of the paper) that justified the need for a greater investment in developing a more general theoretical framework. This concern echoed both Schultz's remark at his AEA presidential address a year earlier as well as Mincer's concerns in his doctoral dissertation (1957).

The interaction with Mincer is visible on several accounts, not least by the prominence given to on-the-job training, which is the first topic to be addressed at length in the paper in 1962. This is even more striking given that the paper presented by Mincer at that same conference was an analysis of investment in OJT and the returns on those investments. Becker's view converged with Mincer that this type of investment was often underrated (especially vis-à-vis schooling and formal training) given its complexity and the lack of information. Moreover, he considered that this type of investment illustrated vividly the impact of investments in human capital on earnings, employment, and on other economic variables. Throughout the paper, it is apparent that the work was being developed in close interaction with Mincer, notably in reference to the latter's ongoing work on labour supply of women (initiated when he was at Chicago) and some of the empirical strategies developed by Mincer to estimate some of the costs of investments in training[14].

In 1964, Gary Becker published his monograph *Human Capital*, which largely extended those papers he had published in 1960 and 1962, with the latter including most of the theoretical framework and providing an extensive picture of what was already becoming known as human capital theory[15]. He defined human capital as "activities that

influence future monetary and psychic income by increasing resources in people" (Becker 1994, 11), and its main forms were schooling and on-the-job training, although he also considered medical care, migration, and searching for information about prices and incomes.

4.2 Developing human capital's theoretical framework[16]

Becker's main purpose in the development of the book evolved from an empirical one to an increasingly theoretical one. Becker became increasingly focused on developing a general theory of human capital investment and not merely on assessing the profitability of those investments. That included an explanatory framework for the shape of age-earning profiles, the concentration of human capital investment at earlier ages, and the personal distribution of income, on the basis of the process of accumulation of human capital, and extending Mincer's work on personal distribution of earnings by relating the distribution of earnings explicitly to rates of return and investment costs (see Mincer 1957, 1962). As indicated in his 1962 paper, Becker started his analysis by focusing on the hitherto largely overlooked on-the-job training. The emphasis on this type of capital was justified for its importance among types of human capital and the transferability of the analysis for other types of human capital. He therefore tried to investigate the economic decision-making process regulating the quantity of and time spent in training, which was an important link with the work being developed by Mincer (Teixeira 2007, 2011).

Becker then introduced the henceforth classic distinction between specific and general human capital. Since the latter type of training increased the marginal product of the worker in other firms, the firm would have no incentive to bear any of its cost and would pass it to the worker. The latter was willing to take it because this training increased future earnings, regardless of the firm they were working with. Hence, they accepted wages below their current opportunity level in order to cover the costs of their training. This would produce a steeper curve of earnings since at earlier ages workers would bear the costs of training and at later ages would benefit from this investment. Then Becker analysed specific training which increased the productivity of the worker more for the firm providing it. In this case, the worker would not be willing to support its costs, and the firm would be willing to support most of its cost since it would collect the returns in the form of higher productivity. Firms would tend to pay a premium to workers benefiting from specific training in order to reduce turnover and therefore avoid losing the investment made (which becomes a type of sunk cost)[17]. He acknowledged that most training was actually neither completely specific nor general, and therefore the cost would tend to be shared between the worker and the firm, depending on other attitudes such as those towards risk, desire for liquidity, and especially patterns of labour turnover.

Then Becker discussed the assessment of rate of return to the investment in human capital, which was being analysed in several earlier studies of human capital research and would become a cornerstone of the economics of education (Blaug 1985; Teixeira 2000). In this analysis, he focused on the case of general training (assuming that the case of specific training could be done in a similar way) by analysing the way in which human capital's costs and returns could be introduced into an equation representing the present value of lifetime net earnings. This approach was hindered by the fact that

the specification of the investment period was not straightforward and by the existence of imperfect knowledge of foregone earnings. Thus, Becker decided to adopt an approach that assumed the cost of an investment in human capital as the earnings foregone and the rate of capitalisation as a weighted average of the rates of return on the individual investments. By doing this, one would not need to know the period of investment since this (and the costs and returns) could simultaneously be estimated from information on net earnings. This allowed Becker to explore the evolution of the incentive to invest in human capital in different periods, notably the relation between lifespan and the rate of return.

Becker's approach had the advantage of providing a unified explanation for an array of behaviour related to human capital. Firstly, it helped to explain the longer periods of schooling demanded by younger generations as a result of different incentives (i.e. longer periods of life raised the profitability of those investments). Secondly, it was helpful in understanding why individuals switching between activities, thus with a preference for more general training and less specific training, had depressed their prospects in terms of earnings (the obvious candidate here being female labour). Thirdly, it suggested that the spread of education was largely induced by technological progress by raising the demand for skilled labour through the effect on the rate of return (as measured by wage differences and costs)[18]. Finally, the lifetime perspective helped to place into perspective the difficulties in financing investments in human capital and the risk of under-investment due to shortsighted behaviour by young people, which had been a long-time concern among economists[19].

This issue of placing human capital choices within a lifetime framework would be further developed by Becker in his attempts to reformulate consumer theory by adjusting it to encompass the allocation of time and goods within the household (1965). This model was extended by introducing a third sector (investments in human capital) to a framework of decisions over time and to investment in human capital. This approach aimed at including the interaction between changes in wage rates over the life cycle resulting from the accumulation of human capital, the allocation of time between market and non-market sectors, and the impact of human capital on the productivity of household behaviour. This came at a time when Becker was largely focused on his economic analysis of family behaviour[20]. This framework explained the decline of investment in human capital with age due to reduced profitability (smaller time spans and rising foregone earnings). This approach also underlined the effect of human capital on non-market efficiency, leading for instance to different patterns of consumption[21].

4.3 Becker's empirical analysis and its limitations

In the second part of the book, Becker developed his empirical analysis, which was the initial motivation for the study and was an issue of great concern given the resistance faced by human capital research. The analysis, focused on the census reports on the incomes of persons with different amounts of education and reports from the Office of Education on the costs of education, enlarged its coverage to different groups and periods. The main group analysed was that of white male college graduates, using cross-section samples for 1939 and 1949. Becker emphasised the relevance of foregone earnings in terms of costs rather than direct costs, thus the impact of good economic conditions and the lack of information and motivation, as the main reasons limiting

poorer students' investment in human capital. He also considered, though less extensively, other groups of college students, such as college dropouts, non-whites, women, and rural workers. Overall, these groups presented smaller (though not negligible) returns. This analysis indicated significant variability between and within groups, something that would occupy much subsequent research on human capital (see Rosen 1977 and Freeman 1986).

In his analysis, Becker acknowledged several empirical limitations, such as the fact that the data were cross-sectional (hence, more vulnerable to the effects of business cycles) and the concentration of the analysis on formal education[22]. However, the main problem was the possible effect of other factors, such as ability, leading to an overestimation of the effect of schooling. He made some adjustments trying to standardise the returns for ability, namely by comparing the case of college students with that of high school graduates. The results for the separate adjustments for rank in high school, IQ, and father's occupation suggested to Becker that the rate for college education for a typical graduate was still consistently higher than that of a typical high-school graduate. He also analysed college dropouts, and his results indicated that these had rates of return (and IQs) slightly higher than high-school graduates and lower than college graduates, which was interpreted as further support of the human capital interpretation. Finally, he analysed the sample of brothers assembled by Gorseline (1932), underlining the effect of education even when attempting to standardise for other factors. Subsequent research on the economic effects of education would devote significant attention to these interactions, namely to the possible correlation between IQ levels and educational demand and the impact of ability in explaining the level of and the change in the return to schooling (see for instance, Griliches and Mason 1972; Ashenfelter and Rouse 1998; Heckman and Vytlacil 2001).

The impact of mass higher education on rates of return was also an important issue. According to Becker, the rise of mass education, instead of bringing a strong decrease in returns, as implied by the scarcity hypothesis and the idea of quasi-rents for educated workers, had shown some stability and, by this, endorsed productivity effects of investments in human capital and a skill-biased technological progress that demanded increasing levels of qualified labour. This rationale would be significantly challenged in the following decade, with the slowdown of growth and the arrival of the post-war baby boomers to the labour market (Teixeira 2000)[23].

In his empirical work, Becker privileged the study of private monetary returns to human capital due to the difficulties associated with the measurement of externalities and social benefits. The latter topic was rather complex since the limitations, in terms of measurement, made the results very vulnerable to criticism. In his AER paper in 1960, he had delved more into the social benefits; though, in the book he removed some of this material because he did not have an adequate way to measure them. He did not want to oversell the social benefits, but he could not see exactly how great they were. The more he delved into it, the less convinced he became at the time that he could make a strong empirical case for the existence of these benefits. His position would anticipate what would be the subsequent development of empirical research in human capital: much greater attention to private pecuniary returns, something that nurtured significant scepticism regarding externalities (see Arrow 1993) and delayed development of research about non-monetary benefits (McMahon 2004). This is particularly interesting

given his persistent interest in non-market behaviour; though, it seems to have been justified by the lack of robust data that could support those calculuses. The analysis of these social and non-pecuniary benefits would require specific empirical work that would be done some years later at the NBER, with a significant contribution by some of his doctoral students[24].

Despite the caveats and limitations, the empirical analysis presented by Becker in the first edition of *Human Capital* regarding the profitability of investment in schooling was a rather optimistic one, especially in with respect to the college level. This converged with other pieces of research being published around that time (for an overview see Schultz 1971). Nonetheless, the reactions would focus on its analytical framework, which would contribute to Becker's emerging reputation as an innovative and controversial economist and would attract both enthusiasm and strong criticism.

5 The initial reactions to Becker's work and its subsequent impact on human capital research

From its early days, human capital research faced significant resistance. Initially, the problems concerned mostly the label "human capital" for sounding like exploitation, making the concept a problematic one not immediately well accepted either within or beyond the disciplinary boundaries. The criticism of human capital research echoed earlier debates about the best approach to labour economics, notably the applicability of the market metaphor to labour issues and the potential for measurement and quantification. It was also the role of education and its economic effects, with many authors believing that education was primarily a socialising force that instilled values of discipline, obedience, and motivation that were rewarded by the labour market. Then there were those emphasising the family background effect on earnings, suggesting that students with better opportunities would have much better possibilities of achieving and benefiting from higher levels of education.

The negative reactions to Becker's work began when he presented his preliminary results at the AEA 1960 meeting. In his comments, Henry Villard criticised the reliance on earnings to measure the full economic effect of education and the poor attention given to indirect returns. These should prevent a full reliance on the market to assess the optimal quantity of education to be provided. The book's reviews also indicated a mixed response. The most positive came from Albert Rees and Melvin Reder, both associated with the Chicago Economics Department. Rees, in the AER, considered that Becker's book was the most sophisticated theoretical and empirical analysis of investment in people thus far. Reder, in the *Journal of Human Resources*, thought that it was a major work of applied economics and that the hypothesis performed rather well in empirical terms.

Whereas Rees and Reder praised his work, Robert Solow considered that the overall approach was unhelpful and awkward. Despite praising Becker for his theoretical ingenuity and empirical resourcefulness, Solow was not very convinced. In terms of private returns, he pointed out that the ability bias could be far more significant than Becker had indicated and that an educational certificate could be regarded as an indicator of persistence and stability, hence, making the educational system, at least in part, a kind of screening mechanism. This echoed his earlier remarks on the economic value of education at the 1959 Seminar on the Economics of Education (published in the

Review of Economics and Statistics), where it was argued that the income differential might reflect the market advantage of the college graduate[25].

As for social returns and externalities, Solow criticised Becker for not discussing them more completely, let alone measuring them extensively. Becker was also criticised by Graham Pyatt in the *Economic Journal* for his thin empirical support of his hypothesis and for rushing to conclusions about the explanatory power of the whole approach. Hence, if, for Rees, Becker's human capital represented a type of work very different from traditional labour economics that would become classic in the field, Solow considered that the results were interesting despite the fact that he considered Becker's approach as being originated by messy questions.

Becker expected to receive significant criticism. The label "human capital" had been regarded as potentially problematic. T. W. Schultz (1959) sometimes used "human wealth" instead of "human capital" in his earliest writings, and Becker considered an alternative title for his book, though he eventually decided to face the foreseeable criticisms and run the risk[26]. In the 1960 annual meeting of the AEA, Becker felt a large amount of hostility from the audience as critics saw calling them human capital a way of reducing people to machines and inanimate objects. Most of the criticisms referred to the analogy with other types of capital, echoing criticisms faced by Irving Fisher's (1904) pioneering work (1896). In his comment on Schultz's address, H. Shaffer (1961) argued that capital meant, for most economists, physical capital and that this was not because of any convention, but because physical and human capital were actually very different things. Human types of capital presented a mixture of investment and consumption motivations, including factors such as social prestige or fads, which could not be easily isolated (see Eckaus 1962). This was particularly relevant in terms of measurement, preventing an accurate appraisal of this type of investment.

Another set of criticisms referred to the fact that education and other types of human capital omitted the impact of very important differences in terms of personal traits, such as ability and socio-economic factors, something that Becker was also concerned with (as seen above). Some argued that there would be an overestimation of the returns to this type of human capital, which would capture the effect of factors such as experience, natural ability, social class, and family connections (Renshaw 1960). Moreover, and because these were hard to specify and measure, one would find oneself dealing with average benefits instead of specific returns to each individual investment. The returns ascribed to schooling could in fact be the result of problems of limited information in the labour market or the scarcity of certain types of skills rather than a return to a more productive worker due to better qualifications (Eckaus 1962).

On the other hand, the empirical limitations created important problems. The analysis was putting aside the important issue of the differences in terms of quality of schooling (Renshaw 1960; Arrow 1962). The data limitations would also probably lead to an overestimation of the returns since the analysis would be done with cross-section samples and not follow lifetime earnings of the same age cohort. These problems, which affected to a greater or lesser extent all types of human capital, emphasised the limited usefulness of this approach in terms of policy-making and individual investment decisions (Shaffer 1961). Furthermore, this approach, by placing the emphasis on the economic arguments,

which did not seem to provide a very robust argumentation, was contributing to debasement of the public support for education.

Many considered that although human resources were widely accepted as a factor critical to economic growth, human capital's theorists had taken the analogy too far by turning education into a business-like activity and placing too much emphasis on the economic-rational motivations underlying education decisions. This was a self-defeating approach since it limited the credibility of human capital and weakened the value of education. For Chamberlain (1967), research about human capital (and Becker's work in particular) illustrated the limitations of mainstream economics, namely its disregard of the role of tastes and uncertainty, and its restrictive assumptions (especially in terms of the purposiveness of human actions).

The reactions to Becker's human capital suggest two important aspects that would shape the subsequent development of human capital research. On the one hand, the analytical framework developed in the book would become a cornerstone of the forthcoming development of human capital research, with an important amount of work being devoted to refining several of its concepts and to elaborating its empirical support. On the other hand, for many economists and non-economists, human capital was increasingly associated with Becker and his approach to economics and not merely as a theory attempting to explain certain important implications of education and training for the labour market and the economy as a whole.

This identification of human capital with Becker (and his approach to economics) does not mean that his work was developed separately and disconnected from other earlier pioneers in the field. In fact, the development of human capital theory throughout the 1960s owes very much to the collective efforts of Theodore Schultz, Jacob Mincer, Gary Becker and their younger colleagues and graduate students. However, each of them had a distinctive and valuable contribution, and Becker's was not only in providing some major original contributions but also in giving human capital analysis a depth and breadth that would favour its subsequent development and its application to multiple issues. Becker's work was far less significant in providing greater empirical support to human capital theory (as shown by the fact that the empirical part of his book was not even updated and/or extended in subsequent editions). The originality of Becker's approach was also nurtured through the establishment of a community of scholars that could extend, discuss and substantiate these initial contributions, often in close interaction with those other researchers such as Schultz and Mincer.

The role of Becker in that respect was very important as far as Columbia is concerned. Becker moved there in 1957 and helped make it the major centre of research on human capital in the 1960s, together and in close interaction with Chicago. Becker, at the time, mainly taught microeconomic theory to graduate students and used it as a platform to illustrate the potential of economic theory in explaining human behaviour, in particular several phenomena such as education, training, allocation of time, and discrimination. This was not only original, but it revealed itself to be very attractive for a generation of promising graduates at Columbia, as confirmed by the number and future prominence of those who wrote their dissertation on the topic of human capital or related subjects[27].

The impact of Becker's research was magnified when Mincer came to Columbia (see Becker 2006)[28]. They ran the Labor Workshop, supervised many good students, some

of them later becoming prominent researchers in the field, and cooperated in major projects at the NBER[29]. Despite cooperating closely, these two men always had very different styles of research, which in this case proved to be effectively complementary. Whereas Becker explored matters more on a theoretical basis, Mincer took a more empirically-oriented approach. The latter was more interested in showing to his students how human capital research could be applied in order to explain manifold aspects of the actual labour market, while Becker's influence is more visible in the extension of his human capital model and its applications to non-market dimensions. This was also linked to their interest in time allocation, which started independently but converged and was extensively developed in several of their papers in the 1960s and in the work of several of their students (see for instance, Becker 1965 and Mincer 1963)[30].

Their partnership was also crucial in gathering institutional support for new research cohorts, notably by using the NBER as a major platform for large research projects and in attracting and supporting young and promising labour researchers. In fact, research on human capital and its implication became one of the most active and visible streams of research in the NBER in the 1960s. The expansion consisted of bringing in relatively young researchers, graduate students or post-doctoral fellows that could develop or continue their doctoral topics of research at the NBER. This created a close and interacting environment for research that proved to be very attractive and stimulating, especially for these young researchers. It created a kind of cluster of economists working on related topics, physically close to each other, with many discussions focused on new applications of human capital that were very much stimulated by Becker and Mincer[31]. Thus, despite the resistance, throughout the 1960s, research on human capital became firmly established within the NBER, and the Bureau also had an important supportive role in disseminating the results of research via conferences and publications[32].

6 Conclusion

In recent decades, human capital has become one of the earliest and best-known examples of the application of basic economic concepts to a broader set of topics in human and social behaviour, and Gary Becker was its leading proponent. This expansion of economic analysis has also been associated with a steady development of specialised economic fields that have tried to explore the potential and limitations of using economics to study a large array of topics (Backhouse and Biddle 2000). In the case of human capital, this research has infused several of these applied fields, with particular emphasis on labour economics, the economics of education, growth economics, development economics, population economics, household economics, economic history, and the economics of health.

In this paper, I have analysed the first decade of Becker's research and the central role that it played during the early period of his career. These were crucial years in positioning Becker as an influential and controversial economist. We have placed Becker's early contributions to human capital research within the broader and overlapping contexts of his intellectual development and within a circle of interactions and collaborations that revolved largely around Chicago's and Columbia's Departments of Economics. This network was very important in stimulating Becker's interest in researching human

capital and in helping him to develop original and influential contributions within a collaborative framework.

Following original insights provided by the pioneering work of M. Friedman, T. W. Schultz, and Jacob Mincer, Becker turned human capital into a framework for understanding several aspects of lifetime human behaviour, providing an effective and powerful example of the ability of economics to deal with social issues. To a certain extent, human capital was an illustration of what distinguished economics from other social sciences was not so much the object as the approach. The approach gave to economics the capacity to provide a unified perspective on human behaviour in many different contexts through the basic assumptions of maximising behaviour, market equilibrium, and stable preferences.

During that first decade (1955–1965), Becker faced significant issues to the form and substance of his peculiar way of doing economics, and human capital illustrates vividly the type of issues raised regarding his approach. If the label "human capital" was very problematic, its content was no less so. The idea that a topic such as education could be analysed from an economic perspective faced significant scepticism among economists and non-economists. Moreover, the association of Becker with Chicago economics also led to criticisms, as this was regarded as an indirect way of debasing non-economic rationales supporting education and adopting market-friendly views in an important area of social policy.

Despite those criticisms, the networks that Becker helped to forge, notably with Mincer at Columbia, played an essential role in expanding the support for his particular approach to human capital and education issues. This does not diminish the originality of his approach, but rather it underlines the important intellectual exchanges and networks that helped him strengthen and expand what was regarded at that time as a problematic approach to education. The close interaction with Mincer, Schultz, and Becker's younger colleagues and students at Columbia and at the NBER shaped and sharpened his views, helping him explore possible interactions and developments. Moreover, they became an active network that was essential in disseminating Becker's ideas among other economists.

Later in his career, human capital theory per se became less important to Becker. Human capital became part of a theory of social behaviour rather than a self-contained theory, and the more Becker advanced in his research, the less he seemed to be worried about exploring the initial links of human capital with income and labour performance. However, in the first decade of his career, it represented a major step in the development of that economic approach to human behaviour. Moreover, by giving to human capital a broader and vaguer content, Becker contributed in a way to promoting its circulation, notably by it becoming part of economic, scientific, and political jargon and helping to erode the resistances to his economic approach. For Becker, human capital increasingly became a framework to understand several aspects of human behaviour, providing an effective and powerful example of the ability of economics to deal with social issues. For this to become possible, the intellectual and personal foundations established during that first decade of research were essential.

7 Endnotes

[1]This article builds on the author's previous works on the development of human capital research and Becker's contribution in that respect (as listed in the references).

This piece also benefited significantly from an unpublished interview with Gary Becker that took place in his office on 27th March 2002 (and subsequent exchanges following that interview).

[2]The importance of his work has caused contrasting reactions. For more positive views, see Fuchs (1994) and Baron and Hannan (1994). For more critical ones, see Shackleton (1981) and Fine and Milonakis (2009). See also Teixeira (2010a).

[3]It can be added that this was recognised in the various prizes and honours that he received during his lifetime, mentioning his work on human capital as one of his major contributions. This was the case, for instance, when he was awarded the Nobel Prize in Economics (awarded in 1992) and the John Bates Clark Medal (awarded in 1967).

[4]The attention to human capital was left mostly to authors with other backgrounds and interests. Among this heterogeneous and small group, there were those discussing the value of national wealth and the economic value of population, those debating the costs of war, those like actuaries, whom due to obvious practical needs were assessing the economic value of life, and a few academics attempting to address the economic value of education. Some good examples would be the work of Donald Eugene Gorseline (1932), who tried to analyse the probable effect of schooling on individual income by analysing a sample with pairs of blood brothers, and J. R. Walsh (1935), the American economist and professor at Harvard who analysed whether the amount spent on schooling and professional training was a kind of investment analogous to those in factories and machines.

[5]Allan G. B. Fisher was Professor of International Economics at the *Royal Institute of International Affairs* and later became a senior official at the IMF. In several publications in the 1930s and early 1940s devoted to issues of economic development, Allan Fisher placed a particular emphasis on the role of education and training (see in particular, Fisher 1946).

[6]Education could also play an important role in the reconstruction of the international system, especially in helping the economic development of poorer countries, where the poor quality of education was even more acute, with greater scarcity of adequately trained labour, enhanced by a lack of resources to reverse that situation. Accordingly, he suggested the establishment of mechanisms of international cooperation focused on the support of educational development.

[7]This may have been stimulated by his experience in the post-war period (when he was part of the commission advising the reconstruction plans for West Germany), which may have solidified his previous view that education made economic agents more productive. His thinking on investment in human capital was further advanced during his year as Research Fellow of the Center for Advanced Study in Behavioral Sciences (Stanford) in 1956–57.

[8]Alice Rivlin noted, "If you attended the 1960 meetings, you will recall that most members looked blank when they heard this title. Investment in what? Professor Schultz spent a large part of his address establishing his right to talk about the subject at all". (Rivlin 1966, 395).

[9]Already in the early 1950s, as a graduate student, he submitted a paper to the *Journal of Political Economy* on what would become the economic analysis of political phenomena. However, a very critical refereeing by Frank Knight disappointed Becker and delayed its publication for a few years (see Becker 1958).

[10]The support provided by the Department was very important at that stage, given the resistance towards this type of economics. Apparently, the University of Chicago Press did not want to publish the book given the not very favourable referee report it had received. Friedman had to convince the Department of Economics to put forward some money to subsidise the publication of the book. The book reviews were on the whole not very unfavourable, notably the ones by people somewhat linked to Chicago.

[11]In the second edition of the book (1971), he added an addendum to chapter 8, reprinted with minor changes from the first edition of his book Human Capital (1964), on income differentials between college and high-school graduates. In his analysis, he would emphasise that those differentials were substantially less prominent for non-white workers than for whites.

[12]The problems were not over since the publication of the study was delayed due to some of his very critical conclusions, in particular those referring to the restrictions affecting access to the medical profession. Finished in 1941, after some delay, the study was eventually published in 1945, with a very critical remark by one of the NBER's directors, G. Reinold Noyes, who played down the effect of education in explaining differences in incomes and showed himself unconvinced by the arguments on social and legal obstacles. For him, the differences were mostly the result of differences of ability.

[13]Nonetheless, it should be noted that the study enhanced the role of education and training in income patterns through a compensatory principle. That is, the impact of educational differences on income differences was sustained on the basis of a compensation for its costly and lengthy nature, and not so much by its enhancing-productivity character.

[14]For Becker's own account of this, see the transcript of his speech in the closing session at the conference in honour of Jacob Mincer (Becker, 2006).

[15]The edition taken as a reference will be the third one, which is the most easily available for the reader. It should be noted that the structure of the book did not change fundamentally in subsequent editions and that everything that was included in previous editions was kept. In the second edition (1975) Becker introduced three addenda. The first one was on the allocation of time and goods over time, taken from his 1975 monograph with Gilbert Ghez (pp. 70–85), and two were on income distribution: part of his paper with Barry Chiswick (1966) published in the AER (pp. 102–8) and his Woytinsky Lecture of Becker 1967 (pp. 108–158). In the third edition (1994), Becker introduced a general chapter with an overview of the achievements of human capital research (pp. 15–28), and the whole third part consisted of three previously published papers on the relevance of human capital for family's inequality, division of labour, and fertility behaviour (pp. 255–349).

[16]For more details on this, see Teixeira (2010b).

[17]Specifically trained labour became a quasi-fixed factor, as it had been suggested in the pioneering work of Walter Oi in his doctoral dissertation (1962), which had been developed at Chicago.

[18]This would later become known as skilled-biased technological change and would be regarded as a powerful argument in favour of expanding the qualifications of the labour force (see Goldin and Katz 1998; Autor et al., 2003).

[19]This was a long-standing argument favouring public support since John Stuart Mill and Marshall's pioneering analysis (see Teixeira, 2005).

[20]Along these lines would be the work developed a few years later with one of his students, Gilbert Ghez (1975), on the allocation of resources by families over the lifetime of their members. That followed the earlier contribution by Yoram Ben-Porath in his doctoral dissertation at Harvard (1967).

[21]He would extend this in the late 1960s in his Woytinsky Lecture (1967), in which Becker analysed the differences in investments in human capital as the result of differences in the supply or demand conditions. For Becker, it was the interacting effect between ability and schooling that helped to clarify Pigou's paradox, i.e. the skewness of the income distribution curve. Overall, he suggested some overstatement of the effect of schooling on earnings and understatement of the effect of background.

[22]Both issues would also be at the top of research concerns in the 1960s and 1970s (see Blaug 1976 and Griliches 1977).

[23]However, the following decades would provide greater support to Becker's hypothesis (see for instance, Goldin and Katz 1998 and Murphy and Welch 1993). Interestingly, this was also at the centre of one of his last published academic papers (see Becker et al. 2010).

[24]For a review of the advances and limitations on this topic see Haveman and Wolfe (1984) and Currie (2009).

[25]In that seminar, people such as Dael Wolfle would suggest that the basic trend associating higher earnings with higher levels of education did not take into account unmeasured differences, and D. S. Bridgman insisted on the potential role of ability among those unmeasured factors.

[26]Becker thought carefully about this and considered the possibility of using human resources or returns to education instead. He eventually decided to run the risk and use human capital, although he had a long and more neutral subtitle, aware that other people working in this area tried to use more palatable language in order to overcome some of the hostility. Many years later, he would look back and feel vindicated and happy that he had used human capital.

[27]For more details on this see Teixeira (2007) and several chapters in Mincer's honouring volume (Grossbard, 2006).

[28]Mincer joined the Economics Department at Columbia University as Associate Professor in 1960 after two years as Assistant Professor at City College New York. In 1962 Mincer would become Professor of Economics, staying at Columbia for the rest of his career, except for a few brief spells as visiting professor at other universities (for more details on his career see Teixeira 2007).

[29]According to Becker's recollections, he established the workshop at Columbia after his arrival based on the experience of graduate supervision at Chicago. After Mincer joined him at Columbia, he was appointed co-director.

[30]The recollections of their former students are quite unanimous about the impact that both Mincer and Becker had on them in their first year of graduate education. In particular, in Becker's class, there were problem-sets every week, and students were supposed to go through them with a study group, developing a kind of tight network with a great deal of interchange and cross-fertilisation.

[31]Although they have never published a joint paper, they have written one that remained unpublished. According to Becker (2006), they did a paper on a forward-looking, perfect foresight model of the relation between consumption and income. This contrasted with the prevailing view at that time in time-series analyses, which regarded consumption as mainly influenced by past and present income. The paper had a theoretical model and some empirical work, but was not published, possibly because they wanted to develop it further and eventually never did.

[32]In terms of publications, the list is very significant and includes, besides the volumes related to several important conferences, Becker's book in 1964, his Woytinsky lecture in 1967, and Becker and Ghez's book in 1975. The NBER also published some of the most important doctoral dissertations of those young researchers working on human capital at the Bureau, such as the ones by Barry Chiswick, Robert Michael, and Michael Grossman, all of which presented important influence of Becker's work (and Mincer's). Other important works on human capital by other authors included Mincer's book in 1974, Taubman and Wales' series of publications on schooling as human capital and as screening, and Schultz's appraisal of the development of research on human resources within the Bureau on the occasion of its 50th anniversary.

Abbreviations

NBER: National Bureau of Economic Research; JPE: Journal of Politcal Economy; AER: American Econmic Review; AEA: American Economic Association.

Competing interests

The "IZA Journal of Labor Economics" is committed to the IZA Guiding Principles of Research Integrity. The author declares that he has observed these principles.

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