Jacob Mincer and the Centrality of Human Capital for Contemporary Labour Economics

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1. Introduction

Although Jacob Mincer (1922-2006) is one of the most important economists of the second half of the twentieth century, limited attention has been given to the analysis of contribution to economic science. This is unfortunate because Mincer played a very significant role in shaping contemporary labour economics, not the least by largely determining its research agenda. When we compare what labour economics was in the 1950s with more recent decades we find striking differences and although this evolution was the result of the work and influence of many authors, Mincer was arguably the most important character in that transformation. His work in the sixties and seventies on the determinants of individual earnings (notably human capital) and on labour force supply (especially female participation), as well as more recently with his research on job mobility has had an enormous impact on the way others have approached labour economics.

Thus, the main purpose of this text is to provide a better understanding of Mincer's work and its relevance to the development of contemporary labour economics, namely by making human capital a cornerstone of labour research during the last 40 years. Despite Mincer's initial critical views about labour economics, it eventually became his natural disciplinary habitat. Accordingly, the text starts by analyzing the situation in labour economics by the mid-fifties, when Mincer was starting his career. Then we analyse his pioneering work on human capital theory and the multiple applications that Mincer made of its theoretical nucleus. In the final part of this text we explore the influence that Mincer had in several generations of labour economists, namely in using human capital as a basic framework to explain dimensions of labour market.

2. Labour Economics in the 1950s

Until the 1940s labour research was quite different from what we regard presently as labour economics. It was very broadly and loosely defined as labour problems and labour issues. It had much more fragile links with the economic discipline, both theoretically and institutionally. It hardly used neoclassical theory, let alone price theory. It preferred interdisciplinary approaches, historical and industry studies (notably on the role and development of unions' and employers' organizations). The heterogeneity of researchers in terms of interests and approaches reflected in a scarce cohesion of the field. These characteristics were illustrated by any standard textbook on labour issues before the World War II, which would regard the subject as an introduction to the study of industrial relations, rather than labour economics, a term hardly used. The attention was focused in making the reader aware of the factual realities framing and characterizing those relations and the remedies proposed to the problems emerging from those industrial relations. In order to come to grips with this topic, therefore, not only was the valuable contribution of economics necessary, but also those of sociology, politics, history, law, psychology and ethics.

Thus, labour research shared the pluralism that characterized economics as a discipline, especially in the US (Morgan and Rutherford, 1998). This pluralism was very much expressed in the visibility of eclecticism among and in each researcher (Samuels, 1998), which emerged in their training, beliefs (Rutherford, 1997), and citation practices. Many of these economists would be trained and work in very different academic environments, with a high variety of theoretical and methodological approaches. Moreover, it was not unusual for them to be influenced by authors with different theoretical and methodological approaches. With the World War II, and especially during its aftermath, things would change, for economics in general and for labour research in particular. This eclecticism would give place to an increasing vitality and dominance of neoclassical economics and weakened influence of institutionalism.

The end of the World War II was characterized by a redefinition of labour economics research. The main aspect of this change was the progressive curtailment of the apparent isolation that labour research had experienced from its economic foundations. This increasing closeness with economics, meaning neoclassical economics, was certainly related to the emergence of a new generation of labour (economist) researchers. Among this new generation we would find the names of most of those that would dominate the field for the following two decades, such as John Dunlop, Clark Kerr, Richard Lester, Gregg Lewis, Melvin Reder, Albert Rees, Lloyd Reynolds, and Arthur Ross.

This new generation still presented signs of eclecticism. It is true that they shared a much stronger economics background than most of their predecessors in the field, meaning a much thorough knowledge of the neoclassical standard theory. This stronger training would be a factor in making labour research much more focused on the analysis of the economic determinants, and in popularizing amongst labour research a whole set of concepts, assumptions, and instruments from economic theory. However, they were also exposed to other influences, and in particular there were still important remaining links with the institutionalists and with inductive labour research from the pre-war period. Altogether, this young generation would present traits of the different traditions that had characterized labour economic research before the war. Their frequent eclecticism in terms of affiliations and influences was somehow synthesized through the frequent purpose of making the basic (neoclassical) framework more realistic and more robust in terms of and through the empirical evidence.

During this transition many authors believed that it was possible to make a synthesis between the two leading alternative schools of research in the field. They believed that by developing a sort of middle ground they could not only overcome the tensions that frequently dominated the field, but by building on the strengths of each side they would create a synthesis that regarded neoclassical and institutional economics as potentially complementary. A large part of the research in labour economics from the late forties until the late fifties is part of this attempt of building a synthesis. The enthusiasm of this new generation for building a “new synthesis” was visible in an almost frenetic activity that would dominate the research agenda in the field, at least during the following decade, and spanning through textbooks, conferences, and major research projects. One of the main events was the establishment of the *Industrial Relations Research Association* - IRRA in 1947.

However, the idea of synthesis was not necessarily the same for all of them, and the degree of re-examination required by neoclassical economics varied during the period and among authors, from minor aspects to major criticisms. These differences would coalesce in the next decade around a set of major theoretical and methodological debates, eventually leading to a theoretical and methodological clarification within labour research.

The idea that the labour market was a peculiar type was very much embedded in the debates of the period. On the one hand there were those that believed that the neoclassical model of market had to be adjusted in order to account for the specificities of this commodity and the institutional framework affecting labour relations. On the other hand, there were those that considered that this institutional dimension and the non-economical character of the so-called labour supply and demand posed major limitations to the use of (neoclassical) economic theory and its explanatory effectiveness. Hence they called for a new, interdisciplinary approach that lived up to the complexities of this peculiar type of market (see Parnes and Palmer, 1956). However, some neoclassical economists considered that these views had taken the institutional dimension too far and overlooked the pervasiveness of market factors in labour contexts. Labour markets had some specific characteristics, but their overall functioning could be represented by competitive market forces (see Goldner, 1955).

Another debate that illustrated the increasing tension between neoclassical labour economists and the so-called revisionists concerned the neoclassical assumptions on the employers' behaviour, namely, the idea that employers would pay labour at its marginal productivity level, which was part of the so-called "full-cost" controversy of the 1940s-50s (see Mongin, 1992). This came to the forefront due to Richard Lester's (1946) analysis of the relationship between wages and employment, which was fiercely attacked by Fritz Machlup (1946) who considered that Lester's criticisms resulted from a careless analysis of the survey and a poor understanding of the implications of marginal analysis. For Machlup, this critical literature on marginal productivity theory failed to perceive that underneath common non-technical language was a basic rationale of maximization by individual businesspeople.

The debate became increasingly a debate about the nature of labour economics, because in his reply Lester drew George Stigler into the debate and Stigler moved on to clear the lines between the uncompromising neoclassics and the revisionists. For Stigler, the purpose of Lester was not to analyze the contradictions of the marginal productivity theory, in order to improve the knowledge available on economic behaviour, but to indict and reject the theory. Both Machlup and Stigler accused the revisionists of unfairly criticizing neoclassical economics without proposing sound alternatives.

The different views of the labour market and its protagonists had necessarily to shape the way labour economists would see the wage determination process, and has stimulated vast interest on the topic at that time. Many of the new labour researchers frequently expressed doubts about the competitive assumption on wage pricing. Some were highly critical and considered that one of the big failures of the neoclassical theory was present in terms of the wage determination, because the observable declining importance of competitive forces determining wage rates, with the rising of unionization.

For the neoclassics who regarded labour markets as analogous to other types of competitive markets, the process of wage determination was not very different from the one defined by competitive market theory. Although some forces could delay or limit to a minor extent the impact of competitive markets, by no means was this to be considered a central aspect in terms of wage determination. They considered that critics had "discarded more of orthodox theory than is necessary" (Rees, 1951: 149). Otherwise labour economics and especially wage determination risked falling into a casuistic analysis (see Dunlop, 1957). Those authors closer to the neoclassical approach also attempted to show that collective bargaining did not have so much impact on wage determination as many stated, regarding the competitive market as the benchmark for wage determination, and hence for labour research.

Summing-up, throughout the fifties there was an emergent ascendant of neoclassical economics in labour economics. This permeated the debates upon the rationality of agents in the labour market, the significance of economic motivations, and the methodological prominence to be given to deductive analysis and theoretical generalization. The process started during the forties, but instead of stopping in a sort of middle ground, as some of the protagonists preferred, the theoretical/neoclassical ascendancy in labour economics gained momentum. This corresponded to a failure of what some called the efforts towards a "new synthesis" in labour economics.

Several of those more firmly anchored in the neoclassical side considered that the kind of neoclassical revisionism attempted by many of their contemporaries only made the model more fragile and did not add significantly to the understanding of the labour market. The critical tone has drawn strength from the ascendant dominance and vitality of neoclassical economics among the discipline. This evolution was extremely important for human capital research because it made labour economics a far more congenial place for this type of theoretical developments. Moreover, it contributed to make the field far more attractive to other neoclassical economists such as the young Jacob Mincer, who was at that time starting his career as a graduate student in Columbia.

3. Mincer's pioneering interest on Human Capital

When Jacob Mincer started his academic career, labour economics was therefore finishing a long process of change that marked the postwar years. In fact, this traditional prominence of institutional economics was something that made Mincer uncomfortable with labour economics. As a graduate student in economics at Columbia University he had attended some classes in labour economics and disliked what he considered the lack of analytical focus and theoretical guidance. These early memories led him to stay away from labour economics in his early career. However, the growing influence of neoclassical economics in labour research drew his attention and under the stimulus of some labour researchers, Mincer became increasingly interested in applying neoclassical price theory to labour issues, namely to labour supply behaviour. This would become a permanent feature of his work and a large part of his career would be devoted to the analysis of long-term behaviour of labour market agents. His doctoral research led to the analysis of the forces underlying income inequality.

Until the fifties, the enduring view among many economists that personal income basically mirrored factorial distribution of income also contributed to this theoretical underdevelopment. Even recent interest in income distribution, mostly fostered by the so-called Keynesian revolution, had focused on the consequences for macroeconomic variables of a certain income distribution rather than on the investigation of the forces underlying that distribution of income. The emphasis, in most prior research, on forces apparently beyond individual decisions also contributed to this theoretical atrophy (of income distribution research). These included factors such as ability differences and chance, but also included institutional arrangements such as those regarding property and wealth transmission.

Until the postwar period, the exploration of the idea of human capital as an explanatory principle for income inequality was very limited and fragmented (Teixeira, 2005). Until the mid-twentieth century many economists paid little attention to the economic analysis of education and even more hesitated in using human capital as a good analogy for skilled labour. Underpinning these resistances was a belief that education gave access to nice and well-paid jobs without really enhancing people's productivity, and because it seemed problematic and not very realistic to regard qualified labour as a type of capital. Moreover, these two strands, the economic analysis of education and analysis of education in the labour market were hardly connected, accounting for the lack of relevance of education.

In the aftermath of World War II this situation changed, prompted by several developments that converged to give increasing prominence to the economic effects of education. One of those changes was the changing possibilities and interests in the research on personal income, namely the belief that it was possible to provide causal explanations for the distribution of income, and that education was a good candidate to be included among those potential explanatory factors. The second aspect was the postwar revival of growth debates that, alongside the expansion of educational systems in most Western countries, led to an increasing emphasis on the qualification of the labour forces as a key factor in explaining differentiated growth performances. Last, and certainly not least, there was the neoclassical ascendancy in economics in general and labour in particular (for a detailed analysis see Teixeira, 2005).

To a large extent, Mincer's PhD dissertation (finished in 1957 and published in a revised version in the *Journal of Political Economy* in 1958) can be regarded as the first systematic contribution to the emergence of human capital theory. He started with a highly empirical approach, looking at various characteristics of wage earners such as occupation, education, industry, age, and sex; and then searched for a general-theoretical approach. He proposed to use investment in education and training, henceforth widely known as human capital, as a major explanatory principle of the existing distribution of income. In contrast with previous research on income inequality, Mincer claimed there was a need to explore the implications of rational choice theory. This corresponded to the *endogenization* of the forces underlying income distribution, something he regarded to be a follow-up of the efforts of Marshall (1920) and Fisher (1896, 1897), and especially Friedman (see Friedman and Kuznets 1945).

One of the aspects Mincer disliked in labour research at those times was the lack of firm theoretical guidance and the resistance to apply neoclassical price theory to labour issues. The more he advanced with his work, the more he became convinced that underlying those differences of income was a process of rational choice between alternatives of investment in human capital (Mincer 1957, 30–1). Mincer thought that the empirical evidence provided strong support for the hypothesis that occupational choice was rationally based. The emphasis on rational and free choice meant that differences in income were far less the result of chance or natural abilities, rather an inevitable compensation for the advantages and disadvantages associated with each occupation, namely in terms of the training demands.

Until the late forties there were few studies studying patterns of wage differentials (and even fewer studying skilled workers), and the existing ones were scattered and largely descriptive. On the few occasions that postwar labour economists considered the economic role of education, it was in a rather cursory way and among many other factors that contributed to labour productivity (cf. Lester, 1941). Education was not much regarded an instrument of improving directly the productive role of the worker, rather an useful instrument in the formation of citizens and responsible social partners. Moreover, the investment perspective on the demand of education did not make much sense due to the lack of foresight of students of their future professional career and the fact that decisions concerning education were founded on other type of motivations. Wages' differentials were regarded as a result of unequal access to educational opportunities, rather than as a result of different types of labour and of productivity (cf. Lester, 1941).

In contrast, an emphasis on the importance of education and training to the analysis of wages' differences was becoming part of the neoclassical labour canon, notably amongst Chicago economists. Friedman in his doctoral work (1945) had already emphasized the impact of formal training on individual earnings, and throughout the fifties the expression human capital was frequently found in the writings of several Chicago economists. For instance, Becker used it in his doctoral dissertation submitted in 1955. It was also becoming an important concept in the work of people such as T. W. Schultz and Gale Johnson, working in topics other than labour economics. Melvin Reder (1954) analyzed the relationship between occupational wage differentials and education and argued that the economic advantages enhanced by education would promote a longer working life, deepening the benefits for better-educated labourers. Also in Chicago, there was some work on the effect of education on the labour market by doctoral students, mostly supervised by Gregg Lewis.

According to Mincer, the usefulness of a human capital model to explain income distribution was supported by its predictive power. Accordingly, Mincer considered that the evidence supported the view of a higher remuneration for occupations requiring more training in order to compensate the individuals not only for the direct costs of training, but especially for the postponement of their earning period. Moreover, human capital seemed to have a major impact in terms of the rate of increase of lifetime income as a result of on-the-job training. In fact, human capital, when considered broadly (i.e. to include post-school training), was regarded as a powerful force in terms of promoting a stronger rate of individual economic growth, and by making individuals more productive. This was empirically observable on the steeper slopes of the life-path income curves, and by a greater dispersion of income. Mincer considered that the various partial examinations had given robustness to the analysis, by analysing income groups by industry, race, gender, and city size.

4. Launching the Human Capital research program in Labour Economics

A peculiar aspect of Mincer's initial work on human capital was that he developed it largely unaware that other people were interested in turning human capital into an explanatory principle for several economic issues. Mincer and Schultz only became aware of the closeness of their research interests and its unplanned complementarity 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 his main areas of research. Foremost among these was to ascertain the relevance of human capital theory (in particular the role of on-the-job training) for lifetime income and income inequality.

Mincer's attention to the role of on-the-job training within human capital analysis was apparent in his next contribution to human capital research, which was presented at the 1961 NBER conference organized by T. W. Schultz on 'Investment in Human Beings' and later published as the 1962 supplement of the *Journal of Political Economy*. The main purpose of Mincer's paper was to estimate the magnitude of the investments made in this type of training. Mincer assumed an investment approach that would henceforth characterize the human capital approach to training, that is, that 'an individual takes a job with an initially lower pay than he could otherwise get because he knows that he will benefit from the experience gained in the job taken' (Mincer 1962*a*: 52). Thus, on-the-job training implied an opportunity cost that Mincer tried to assess in his estimation.

Mincer's short but intensive period at Chicago would provide him with an important stimulus to explore other implications of human capital in labour analysis. Stimulated by Gregg Lewis and others, throughout the sixties Mincer devoted significant attention to re-evaluating the evolution of the labour force, especially where the participation of women was concerned (Mincer 1960*b*).

The early work on this topic had been very much shaped by Lionel Robbins' classic article (1934). However, Robbins' analysis is focused on the individual, and the family is basically absent. Moreover, in Robbins' framework the dichotomies income/wages and income/prices were the same. Subsequent authors who looked at this topic, such as Paul Douglas (1934) and Clarence Long (1958) had looked at wages and found a negative effect on labour force activity. According to Mincer their conclusions were due to the fact that income and price variables were not separate. Hence, he decided to address the issue of labour supply within the family and differentiate between income and wage, namely because if the family pooled its income, there would be one income variable, and then each individual would have a wage, which is the price variable.

His interest was further stimulated by the apparent contradiction between the cross-sectional and time-series data (see his interview in Teixeira 2006). In his work Mincer attempted to show that cross-sectional and time-series data presented a similar picture in terms of the labour force participation of married women. Mincer (1962*b*) proposed to solve this paradox through a conceptual re-evaluation of the work-leisure choices by considering leisure not merely as a consumption activity, but also as including factors, such as education, that had a productive element. Moreover, he regarded important to expand the concept of leisure by considering the hours of work at home, in non-market activities (Mincer 1962*b*: 65).

In his re-assessment of market labour supply, Mincer emphasised the importance of the family as the appropriate decision-making unit of analysis for decisions concerning consumption behaviour, income pooling, and the choices about leisure and the production of goods and services at home. The consideration of the family as the relevant unit of analysis helped in a better understanding of the issue of income and substitution factors contained in the labour market supply force. In particular, it highlighted the importance of the substitutability between the wife's time and other factors of production at home and between home-produced and market-produced goods. The weaker the substitutability, the weaker the expected negative income effect on the hours of work at home, and the stronger the income effect on hours of work in the market (Mincer 1962*b*: 67).

Also related to the analysis of labour supply, and especially to the participation of women in the labour market, was the analysis of the allocation of time between market and non-market activities. As Mincer had suggested in previous work (1960*b*), these interactions were not only complex but also very significant. Hence, he devoted some attention to certain price variables usually neglected in consumption studies (Mincer 1963). Neglect of these variables led to specification biases that affected the parameters of certain economic relations. Mincer considered that there was a non-market opportunity cost component due to the opportunity cost of labour, time, or other goods, that was not completely accounted for by market prices. Among those opportunity costs, the one most likely to be overlooked was that of time, which was expected to be positively associated with income. Mincer noted that many of our daily activities were natural candidates for the analysis of this issue.

Unsurprisingly, one of the aspects to which Mincer devoted particular attention in his studies of labour supply was the role of education. Indeed, the level of education seemed to play a significant role in explaining empirical differences in labour force behaviour. The labour force rates of wives increased with the head of family level of education and with the level of permanent income, since these two were positively associated (Mincer 1962*b*: 78). Moreover, the educational and occupational trends had not only contributed in bringing more young married women into the labour force (especially when their husbands were acquiring formal education and/or training that temporarily lowered their family income) but also contributed in changing the expectations regarding long-term participation in the labour force. This in turn would stimulate women to investment further in education which would strengthen their attachment to the labour force.

Mincer's research on labour force supply presented several important elements linked with his previous human capital research. First, there was the investment dimension of education activities, which had a productive effect that should be singled out in the analysis of time allocation decisions and should not be diminished by a general leisure concept. Second, there was the consideration of family rather than the individual as the suitable decision-making unit of analysis in the decisions concerning leisure versus work (or home versus market activities), which later would be largely explored in Becker's (1965) theory of allocation of time. Third, the interaction between the earning capacities of the different individuals constituting the household was emphasized. Hence, it was important to consider not only the individual wage, but also factors such as total family income, the individual's productivity (at home and in the market), the substitutability between market and home activities, and tastes. Education played an important role, either directly or indirectly, in all of those variables. Fourth, there was the significant influence of education on labour supply decisions, not the least through changes in tastes. In particular, Mincer's work tended to emphasize the importance of the relationship between education (of both spouses) and the existence of children. Finally, his work called attention to the distinction between transitory and permanent levels of income, which was crucial in clarifying the apparent empirical contradiction between the different data sets and for understanding women's labour force participation.

Mincer continued to research the issues related to labour force participation and by the mid-sixties he explored the link with unemployment in a chapter he contributed to a volume edited by Robert A. Gordon and Margaret S. Gordon entitled *Prosperity and Unemployment* (1966). Mincer's initial attempts were well received and some years later he had the opportunity to include an article on labour force participation in the *International Encyclopaedia of the Social Sciences* (Mincer 1968*a*) in which he focused on the most important and novel aspects of this analysis. The publication of his article provided him with the opportunity to disseminate this approach to a wider public.

5. Exploring the long-term effects of Human Capital in the Labour market

Through his work on human capital and labour supply, Mincer would increasingly tend to privilege a long-term approach to the analysis of labour economics and to play down the relevance of short-term effects and phenomena. This preference towards long-term trends would coalesce during the seventies and is visible in his approach to inequality and the analysis of human capital in a life-cycle framework. At that time Becker was also increasingly interested in this view that broadened human capital's horizons for inter-generational aspects of education, as shown by his Woytinsky lecture (1967), where he developed a model of wealth maximization in order to explain the distribution of human capital investments, notably their concentration at earlier ages.

Becker's model was significantly strengthened empirically by Mincer's 1974 book, notably by emphasizing the role played by on-the-job training in the model's explanatory power. For Mincer, this wage growth was certainly related to firm training. He analysed the issues by comparing indirect estimates of total worker investment costs derived from observed wage profiles with directly observed costs of job training investments. His initial estimates were based on the former method since at that time there were no direct estimates of training available (this only became possible in the mid-seventies for the US case). The direct estimates of job training investment costs require data on the time spent in training per period and the period opportunity cost of that training.

One important issue for the analysis of lifetime patterns of income was that of allocation of time. Although the analysis was focused on analysing inter-temporal differences in human capital investments over the life cycle, Mincer considered that it provided important insights into interpersonal differences. Accordingly, at any moment of the life cycle the marginal cost of producing human capital was lower for people with greater learning abilities. On the other hand, the marginal revenue was expected to be higher the easier the access to financing or the lower the interest rate. Altogether, these two conditions suggested that persons with greater ability to learn, lower funding costs and lower time preference for the present would invest more in human capital in all periods. Since individuals with more schooling were more likely to be fast learners and to face lower discount rates, they were also more likely to invest more in job training. From this analysis, Mincer drew three major empirical implications in terms of lifetime patterns of investment in human capital (1997*a*: S41). First, persons with higher levels of schooling were expected to invest more in job training. Second, those who invested more in job training at earlier stages were also more likely to continue to do so at later stages of life. Finally, persons with greater learning ability or better schooling engaged in more job training activities, even when they had the same schooling attainment in quantitative terms.

One of the aspects that would become a hallmark of Mincer's research, and especially of his work on human capital, would be a strong emphasis on the relevance of on-the-job training. This would strengthen his view that a long-term approach was needed in order to find robust explanations for labour market patterns. This was very much visible in his 1974 book *Schooling, Experience, and Earnings*. In this study, developed within the NBER, Mincer returned to some of the key questions raised in his doctoral dissertation, though now benefiting from the richer data provided by the 1960 census. In this book Mincer introduced the, then to become famous and widely used, human capital earnings function, which related the distributions of earnings and net investments in human capital.

According to Mincer the poor empirical performance of human capital was due to the inability of the schooling model to capture the complexity of the distribution of earnings. Although the rational allocation of resources implied that most of the human capital investments should be undertaken at an early age, Mincer considered inadequate to omit other post-school investments. This led him to underline the importance of training, largely taking place outside educational institutions, and its relevance for individual earning profiles, and the impact of differences in the labour force participation on individual earnings, as pointed out in his research on labour supply and inter-labour force mobility.

By bringing together labour supply and human capital, Mincer could develop influential work on lifetime earnings and gender differences. In his work with former student Solomon Polachek, he attempted to identify and estimate the effect of the accumulation of human capital on women's market earnings and wage rates, but using a revised version of the human capital earnings function to accommodate the shorter, more heterogeneous and more discontinuous participation of women in the labour force. One of the most important consequences of their analysis concerned the so-called wage gender-gap because their results indicated that a significant proportion of the difference between the wage rates of men and women was due to differences in work histories, investments in on-the-job training, and depreciation of skills. Nevertheless, Mincer and Polachek noted that the discrimination could exist not only in direct ways, but also in indirect ways.

One of the major limitations in analyzing the impact of human capital on lifetime patterns of income was due to the available data, though the growing availability of longitudinal data from the 1970s provided new opportunities to explore the issue. Due to his persistent interest in empirically testable theories, Mincer would be at the forefront of the efforts to use the new possibilities in terms of data and in bringing together the theoretical developments and empirical analysis (see Borjas and Mincer 1976). This was the case of the issue of work careers, in particular the relevance and effects of interruptions in work careers, which linked to his main research interests in labour supply and investments in human capital (Mincer and Ofek, 1982).

6. Human Capital and the Dynamics of the Labour Market

By the late seventies, human capital had attained a consolidated position in labour economics and Mincer had given no small contribution to that. In the following years he would continue to explore the dynamic nature of the labour market, especially with regard to workers' mobility and unemployment, using human capital as a basic analytical framework. Although his role in these topics was less influential than the one he played in research on income distribution and labour supply, the analysis of Mincer's work on those other topics shows that underlying and unifying his research was a persistent aim at exploring the explanatory power of human capital analysis.

Until the 1970s, very limited attention was paid in labour economics to the economic dimension of migration. By the mid-seventies, Mincer also became interested in issues of migration behaviour and their underlying economic motivations, namely due to his interest on family economics and especially of labour supply and human capital formation (1977: 1). His study of migration is largely indebted to human capital analysis and to the idea that many economic individual decisions, and many related to the labour market in particular, should take into account the family context in order to be properly understood. In his analysis, Mincer (1977) confirmed earlier views that educational attainment had significant impacts in terms of migration, not only larger individual gains from migration, but also an intra-family substitution effect (1977: 30). The relative earning advantage of one of the spouses led to a weaker attachment of the other spouse to the labour market, or, in a *Beckerian* sense, a division of labour between spouses in terms of market and non-market activities. Mincer concluded that these trade-offs within the family showed how significant it was to consider the household decision-making process for the economic analysis of migration.

Mincer's interest in migration issues was also pursued in his analysis of work careers since these workers posed an obvious case of interruption in labour market participation. In his work with Haim Ofek, particular attention was paid to the case of interruption in the labour force participation due to migration since prior research suggested that these workers had strong upward mobility when they re-entered the labour market at the country of destination, though this growth followed an initial decline from the exit point of the country of origin (Mincer and Ofek 1982). They identified a pattern among interrupted working careers indicating that re-adaptation and renewal of skills were likely to be faster and/or more efficient than new investments in human capital.

Since its outset, human capital theory has pointed out the implications of the acquisition of some types of skills specific to certain jobs and/or certain firms. At the beginning of the eighties, Mincer became interested in the role that those differences in human capital could play in explaining job mobility, stimulated by improvements in the quantity and quality of data. In his work with Boyan Jovanovic, a recent graduate from Chicago, Mincer analysed the impact that individual differences in firm-specific human capital had, through wage effects, to heterogeneity in mobility behaviour and to tenure effects in the attachment to the firm. Mincer and Jovanovic proposed that the significance of mobility should be interpreted differently according to the phase of the life cycle. Intensive earlier mobility should not be taken as an indication about patterns of investment in human capital or ability to find a good job match, but rather as the result of greater search intensity or efficiency in wage gains associated with inter-firm mobility (Mincer and Jovanovic 1979: 32). Persistent mobility at an advanced phase of the life cycle suggested the existence of significant turnover and of reduced investment in specific human capital.

The other main area of attention in Mincer's analysis of the dynamics of the labour market was unemployment. His first piece of work was his article on labour force participation and unemployment in which he analyzed the response of the labour force during the postwar decades in the US (1966: 95–9). The relevance that Mincer attached to human capital in the analysis of unemployment was developed in the early nineties through an analysis of the effects of education on the unemployment patterns among women and men (1991*b*, 1991*c*). In one study, he tried to explore the relationship between workers' education and their unemployment experience (Mincer 1991*c*), and confirmed previous indications that the unemployment difference between more educated workers and less educated workers was mostly due to the incidence of unemployment and far less to the duration of the unemployment experience, though in both cases more educated workers had an advantage (1991*c*: 6). This result, in terms of incidence of unemployment, was largely due to their greater attachment to firms employing them and the lesser risk of these workers becoming unemployed when separated from the firm. The analysis also confirmed the reduced job turnover of more educated workers, namely due to greater investments in on-the-job training activities.

In his analysis of the impact of human capital on unemployment, Mincer developed a separate analysis for the female labour force due to his strong conviction of a different labour force attachment for women (Mincer 1991*b*). The analysis confirmed the human capital's implication that women's attachment to the labour force tended to increase significantly with level of education (Mincer 1991*b*). Education was also found to reduce labour turnover in the case of women. The incidence of unemployment seemed to decline with growing levels of education, as sharply for women as it did for men. Moreover, the probability of unemployment due to a job change also declined significantly with increased education.

In more recent years Mincer would continue to explore new possible applications to human capital analysis. This was the case of his work on economic growth emerged at a later stage in his career, especially from the eighties onwards. His interest was mainly in its effects on the dynamics of the labor market, namely in assessing the impact of economic and technological progress on employment and to what extent the former favored more skilled vis-à-vis unskilled labor. According to Mincer, human capital analysis could improve our understanding of the processes of economic growth and development through its interaction with population issues (Mincer 1984*b*). Notably, the rising cost of time meant that the opportunity cost of rearing children, a time-intensive activity, would increase. This aspect also established a connection with Mincer's earlier work on the labor supply of women.

Mincer's interest in economic growth was clearly concentrated in assessing the relevance of human capital for the analysis of the labor market, namely in testing the hypothesis that technological progress was skill-biased, that is, that the path of technological development was such that it would enhance the demand for more skilled labor. Mincer (1989) considered that human capital played a dual role in the process of economic growth. On the one hand, human capital was a major production factor through the stock of skills that it created via education and training activities. On the other hand (and much in line with more recent developments in growth theory), human capital by being a stock of knowledge was a source of innovation and therefore an engine for economic growth. Hence, for Mincer, human capital was both a cause and a consequence of economic growth, due to the complementarity between physical capital and skilled labor. According to Mincer's view, the empirical evidence seemed to corroborate the claim that an acceleration of technological change increased the demand for more education and training activities (Mincer 1989).

7. Building discipleship through Human Capital

Despite their intrinsic capacities, all prominent scientists, especially those pioneering in a field or a topic, know that in order for a certain topic of research to prosper and endure it needs to develop a community of researchers. Mincer is certainly a good example of the capacity that many academics have to attract the attention of those around them and to interest them in pursuing similar lines of research. His ability to lure students and colleagues to human capital research was extremely relevant for the development of the human capital research program, especially in the early crucial years. Moreover, his persistent and methodical interest in the analysis of the implications of human capital for labour market analysis had a lasting influence on several generations of labour economists and contributed to the strengthening of the position human capital came to occupy in labour economics during the last forty years.

The obvious networks for attracting other researchers to work on the same topic are graduate teaching and research training. In the case of human capital, the teaching hubs were certainly Chicago and, later, Columbia. The visibility of human capital research at Columbia was intensified when Mincer came back to teach there in the early sixties and joined Becker. Throughout the sixties, Mincer and Becker worked closely to establish a community of human capital researchers based at the Labour Workshop and the National Bureau of Economic Research (NBER). During that period they attracted many of their students at Columbia to human capital topics, and guided them through the early phase of their research careers by supervising their PhDs or making them their research assistants at the NBER which, during the early years of the human capital research program, had its offices located in mid-town Manhattan. The impact of this community was emphasized by the fact that several of them eventually became leading researchers in human capital, and in economics. The success of human capital in creating a network of researchers was certainly linked to its ability in attracting graduate trainees and providing the area with new and able researchers, notably in the concerns of labour research.

One of the major vehicles of Mincer's influence on labour research has been through the supervision of many doctoral dissertations. Accordingly, among his former students there are several subsequent prominent human capital and labour researchers. These include people such as Barry Chiswick, Dave O'Neill, Reuben Gronau, Robert Michael, Michael Grossman, June O'Neill, Arleen Leibowitz, George Borjas, Masanori Hahimoto, and Solomon Polachek. In their dissertations they developed several building blocks for the human capital research program and for contemporary labour economics.

Mincer's influence was mainly felt in the analysis of the role of human capital for income distribution and labour market analysis. Several of the students and younger researchers with whom he interacted developed their careers, at least initially, around two large issues. On the one hand, a large group focused on analysing the explanatory role of investments in human capital for income inequality, either in the overall population or between specific population groups, with particular attention paid to gender differences and migrant workers. On the other hand, another large group focused on exploring the contribution of human capital to understanding the interactions between market and non-market behaviour, including issues such as labour force supply, non-market effects of human capital, and home investment in human capital.

One of the areas that initially attracted most interest in human capital, following the pioneering work of Mincer's doctoral research, was income inequality. Barry Chiswick, one of Becker's and Mincer's earliest students at Columbia, analysed in his dissertation the effect of education and training on (regional) inequality (finished in 1966, but only published in an extended version in 1974). Chiswick attempted to show that distribution of income was related to investments in human capital, and that schooling and post-school training were important determinants not only of individual differences in income, but also of regional differences (1974). Chiswick pursued this area further with Mincer some years later when they analysed the role of human capital in US personal income distribution (Chiswick and Mincer 1972).

Important research developed on the role played by education in explaining differences in the economic performance of several specific population groups (especially in the US). One of the aspects that received significant attention in that respect was the possible role of human capital in explaining gender differences (see above for his work with Solomon Polachek). The issue of discontinuity and its obsolescent effects was further developed in Mincer's collaboration with Haim Ofek (Mincer and Ofek 1982).

Another group that attracted particular attention was that of ethnic minorities. Both Mincer (1958) and Becker (1964) noted that although education was largely beneficial for all population groups, there were important variations between specific groups. Initial interest was concentrated on the Afro-American population and Dave O'Neill, one of Mincer's and Becker's first students at Columbia, used military test scores to analyse how far the differences in terms of earnings were due to discrimination. His results suggested that although some of the differences in earnings could be ascribed to current discrimination in the labour market, a significant, potentially bigger difference was the result of a poorer provision of schooling to certain groups.

The analysis of income inequality between different ethnic communities was also closely linked to the study of the labour market performance of immigrant workers. Most of the contributors to this latter topic in recent decades were Mincer's former students, such as Barry Chiswick, or research assistants, such as George Borjas. In many of these studies, nurtured by human capital analysis, the influence of Mincer's work can be found. First, human capital analysis has been used in the issue of transferability of skills between different labour markets and different jobs, especially concerning the now classic distinction between general and specific human capital. Second, the possible complementarities between different types of skills and their impact on the economic return to human capital have been pointed out, notably concerning linguistic skills in the case of migration. Third, Mincer's work with Polachek and Ofek on interrupted work careers and skills' obsolescence has been applied extensively in the case of migrant workers. Fourth, the analysis of migrant workers has highlighted the need for a long-term perspective of the identification of their income patterns, something that has been stimulated by Mincer's focus on a long-term view of the labour market. Finally, the study of migrant workers has enhanced the importance of the family as an essential unit of analysis for many important aspects of the labour market, a view to which Mincer has contributed significantly. The work on the economic effects of migration has provided empirical support to the human capital approach, namely to the idea that migration propensities are clearly associated with educational level (see Greenwood 1997).

One of the most important developments brought about by human capital research was in drawing economists' attention to the interactions between market and non-market choices. Mincer's influence in this respect was very important due to his work on human capital and labour supply. The impact of Mincer's work on labour supply has been acknowledged in various contexts. His influence was particularly felt in work dealing with family supply models and life-cycle profiles, though arguably the major effect was to greatly stimulate economists' interest in the topic (Gronau 2006). This interest has promoted important advances in the study of labour supply during the last decades, namely by recognizing and interpreting empirically the different labour supply functions (Heckman 1993). Other advances refer to the distinction between choices at the extensive margin (participation and employment) and at the intensive margin (about hours and weeks of work), and to the distinction between descriptive and structural labour supply functions. Although some of these advances questioned aspects of Mincer's pioneering work, it is hard to find a researcher working on this who has not been strongly influenced by his work (namely his 1962 paper). Moreover, several of these critical advances came from former students and close colleagues, illustrating the fact that intellectual admiration did not get in the way of analytical discernment.

Some of Mincer's influence in linking market and non-market behaviour was also felt through the analysis of the social and non-pecuniary benefits of education that was carried out in the late sixties and seventies at the NBER, namely by some of Becker's and Mincer's students. Particularly important at the time was Robert Michael's doctoral work which analysed the impact of education on consumption behaviour, notably on consumer efficiency. This would pursue in a more systematic and elaborate way one of the insights contained in Mincer's paper on opportunity costs and time (1963).

Another area stimulated by Mincer's work was research focusing on home human capital. This work was very much initiated by Arleen Leibowitz and Jacob Mincer at Columbia and the NBER at the beginning of the seventies. In her work, Leibowitz suggested that what was frequently regarded as the effect of natural ability could be in fact the result of pre-schooling human capital. The attention to home human capital led other researchers to explore better the factors underlying children's attainment, especially in terms of schooling, and the direct and indirect effects of family background on income, notably via educational achievement. The more persistent attention to the role of the family, education, and socio-economic background led to a more complex picture, in which factors such as the genetic endowment of ability, the family cultural background, and the family's endowment of physical and human capital converged (Hill and O'Neill 1994).

Summing-up, Mincer was truly a mentor to many younger labour economists, attracting many to topics related to his research. Thus, Mincer's important contribution to the development of human capital research was not limited to his own work but to the work that fructified through his interaction with his students and other labour economists.

8. <u>Jacob Mincer - the human capital labour economist</u>

Jacob Mincer is a key figure to understand the changes that took place in labour economics throughout the second half of the twentieth century and the centrality of human capital theory in contemporary labour research. He is arguably responsible for what is arguably the first systematic contribution to the emergence of human capital theory in his doctoral dissertation. He pursued this view further in subsequent work on human capital, lifetime income, and wage patterns. It was this framework within which he developed the well-known human capital earnings function, which would become one of the most widely used tools in labour analysis. Henceforth, economists would not only pay much greater attention to the study of education in the context of inequality, but also regarded it increasingly as a productivity-enhancing activity that could increase future and lifetime income.

Despite Mincer's initial critical views about labour economics, it eventually became his natural disciplinary habitat. Mincer's discomfort faded as the field became increasingly attached to neoclassical economics, and he made an important contribution to the prominence of neoclassical economics in labour analysis in recent decades, notably through his analysis of the long-term behaviour of the labour force. Mincer's initial motivation was to analyse the behaviour of labour supply, especially that of women. This work, which has strong connections to his research on income distribution, was further developed by the analysis of labour careers and patterns of lifetime income. This work strengthened his position of regarding human capital as a major determinant of life-cycle patterns of labour supply and income.

In recent decades, Mincer continued to explore the multiple implications of human capital to labour analysis, namely by working in topics such as worker's mobility in the labour market, unemployment and the effects of growth and technological progress. Mincer used human capital as a basic framework to explain several issues of labour market analysis, thus providing human capital with a central and unifying role in explaining individual behaviour in the labour market.

Mincer’s role was also important as a mentor to many younger labour economists attracting many to topics associated with human capital research. The influence Mincer had on the early research careers of many of those labour economists was felt in the choice of topic for their dissertation, in the choice of their area of specialization, and in their methodological approach to labour research. Mincer’s important contribution to the development of human capital research was not limited to his own work but to the work that fructified through his interaction with his students and many other labour economists.

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