12. JACOB MINCER AND LABOR SUPPLY – BEFORE AND AFTERMATH*

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ABSTRACT

This paper discusses the impact Jacob Mincer's 1962 paper "Labor-Force Participation of Married Women…" had on the analysis and empirical estimation of the supply of married women, and the supply of labor in general. It is argued that this paper has revolutionized the analysis of labor supply. The sharp increase in married women's labor supply still constitutes a challenge to labor economists who try to explain the phenomenon in terms of income and price effects, where these effects are derived from cross-section studies. It constituted a puzzle to labor economists in the 50s and the 60s, still captives of the notion of a backwards-bending supply of labor. Mincer combined a theoretical model distinguishing between three uses of time (leisure, work at home, and work in the market) and Friedman's distinction between permanent and transitory earning. He showed that the wage has a positive effect on married women's labor supply, and that this supply is more affected by transitory than by permanent income changes. The new theory serves as the scaffold on which Mincer builds the empirical estimation. The interplay between theory, data and empirical estimation, and the ingenuity of the empirical research using scant data sources, made this paper the object of emulation. The ideas first discussed in this paper generated many of the developments of the analysis of labor supply over the last four decades.

12.1. INTRODUCTION

The second volume of Jacob Mincer's collected essays (1993) is devoted to studies in labor supply. It is divided into three parts: labor supply in the family context; labor supply, human capital and the gender gap; and labor supply with wage floors. The

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first part includes four papers: the 1962 paper, ''Labor-Force Participation of Married Women…,'' the 1963 paper, ''Market Prices, Opportunity Costs and Income Effects,'' the 1968 paper, ''Trends in Labor Force Participation,'' and the 1966 paper, ''Labor Force Participation and Unemployment.'' The second of these papers heralded the theory of home production, the last two papers address issues that are still the subject of hot debates. The focus of my paper is Mincer's first paper – his analysis of the labor force participation of married women – which, I will argue, revolutionized the analysis of labor supply.

To place the paper in a historical perspective, one can check the reference list of some of the leading surveys of the topic: Mark Killingsworth and Jim Heckman's survey of female labor supply in the 1986 *Handbook of Labor Supply* mentions 14 papers that preceded Mincer's 1962 paper and 165 that followed it. John Pencavel's survey (1986) of the labor supply of men includes 19 pre-1962 references and 169 post-1962 references. Mark Killingsworth's 1983 *magnum opus* on labor supply includes a list of 661 references but only 50 of these preceded Mincer's paper. If one ignores the general references (such as Adam Smith, William Stanley Jevons and Alfred Marshall), the pre-Mincer studies that figure prominently in these lists are those of H. Gregg Lewis, Clarence Long, Paul Douglas, Richard Rosett, John Durand, W.S. Woytinsky, and of course Lionel Robbins' 1930 paper.

Lest it be argued that the ten-fold increase in the numbers of papers devoted to labor supply reflects just an exogenous increase in inputs, the number of AEA members (as proxy for economists' inputs) increased in the period 1966–1984 by only one half. It should also be mentioned that during the period 1953–1969 the AEA membership increased by more than 150 percent. The increase in the AEA membership reflects the increased attractiveness of the economic discipline. The revolution in Labor Economics ushered in by Ted Schultz, Gary Becker, and Jacob Mincer played a major role in the increase of the discipline's appeal.[1]

Over the last 15 years, the paper (already in its prime age) has been cited almost 300 times. In spite of the tremendous outpour of more ''modern'' versions of labor supply studies, at least twenty researchers each year pay homage to Mincer's 40 year old paper, and many more are affected by its offspring.

12.2. BEFORE

To evaluate Mincer's contribution one has to better understand the state of labor supply analysis in the U.S. in the early 60s. The motivation of many of these studies was the changing patterns in labor force participation: the decline in the labor force participation rates of men, and the sharp increase in the participation rates of women. Between 1890 and 1960 the participation of women (14 years or older) grew from 18 to 36 percent, and that of married women from 5 to 30 percent (Mincer 1962, p. 64). But whereas the decline in the labor force participation of men could be easily explained by Robbins' theory of the backward-bending-supply-of-labor, a theory

supported by the cross-section findings, it was much more difficult to find support in cross-section studies for the increased participation of their wives.

Durand (1946) predicted a continuation of the trend, tying it with the decline in fertility, increased urbanization, the increased demand for female occupations and the "development of household conveniences and commercial services". He had, however, to admit that he could hardly find anything in the cross section studies to explain this trend[2]. Rosett (1958) traced the trend to the upward shift in the life-cycle participation patterns of succeeding cohorts of married women. He qualified his single cross-section study predictive value of long time trends, acknowledging it depends on the stability of the cohort profile.

Clarence Long's 1958 NBER study *The Labor Force Under Changing Income and Employment* was definitely the most comprehensive study of labor supply at the time. Long opens his book with the question: "Why do people work?" Going through a long list of reasons and factors that may affect labor supply, he concludes: "Such a lengthy list suggests that economic factors cannot completely explain labor supply behavior, and challenges the simple postulates of the classical economists: that people work less as wages increase, because higher wages enable them to satisfy their needs with less effort." The second chapter of that book opens with a discussion of "Some Theories of Labor Supply Behavior." It is almost as if the author feels he has to apologize for discussing the economic theory in this context: "The many reasons for working and the factors that nourish them are the product of social, cultural, or spiritual forces independent of – even at war with – economic motivation. Nevertheless, there are enough obvious roots in economic soil to warrant inquiring whether economic forces, such as employment opportunities or income, play an important role in determining the supply of labor." Lionel Robbins' paper is mentioned almost as an afterthought. Nowhere in this chapter does Long mention the distinction between the substitution and income effect.

The empirical analysis of females' labor supply is contained in Chapters 5–7. The focus of the empirical analysis is the estimation of the effect of husbands' income on their wives' labor force participation. The analysis is based on grouped data derived from the 1940 and 1950 U.S census: he examines the schooling effect on participation, but he does not try to separate the wage effect from the income effect.

In his attempt to explain the secular changes in women's labor force participation, Long uses data from the U.S. and four other countries (the U.K., Canada, Germany, and New Zealand). Trying to reconcile the cross section results with those of the time series analysis, he relies on technological developments (the increased use of home appliances, purchase of manufactured food, clothing, and market services), the decline in family size, and the rise in women's schooling. The author notes that, though data on the gender wage ratio are scarce, there is nothing in these data to suggest that increased labor force participation of women is associated with the narrowing of the wage gap.

The reconciliation of the trend in married women's labor force participation and the cross section results is a major theme of Jacob Mincer's 1962 paper.

In Mincer's words: ''The search for an answer to this puzzle lent a great deal of excitement to research on the labor-force in the late 1950s. The stakes were obviously high: the need for better understanding of the concepts of the theory of labor supply, and for an explanation of the most significant labor-force trend since the turn of the century.

I became convinced that what was missing in previous studies was a broader decision unit, the family, and a broader concept of non-market activity to replace leisure. Moreover, the study of labor supply behavior of married women actually provided an opportunity to yield separate estimates of income and substitution effects, as own wage and the relevant income (of the family) were conceptually and statistically separable''.

The inspiration for this paper must have come from Milton Friedman's attempt five years earlier (1957) to reconcile the time series and cross-section patterns of consumption. Friedman's distinction between ''permanent'' and ''transitory'' income plays a major role also in Jacob's paper. But the paper is far from being a mere application of Friedman's theory to labor supply. It bears the distinctive Mincer trademark, typical of his other contributions to the theory of home production, the theory of human capital and the theory of immigration.

12.3. THE PAPER

The best summary of Mincer's 1962 paper can be found in his own introduction to the collected essays' second volume (1993, pp. x–xi).

> In this work, the theory of labor supply is recast with several formulations: As in the usual analysis of consumer demand, the household, or family, in which income is pooled, is specified as the appropriate decision unit.
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> The leisure- market-work dichotomy of Robbins' treatment is abandoned with the recognition that the complement to market activity is not merely leisure but all non-market activities, including leisure, household work, childcare and education.
>
> In determining labor supply behavior of family members, the family income variable is common to all members, but the substitution which determines the allocation of labor between the market and the non-market depends on individual market wages and household productivities, which differ among family members. The labor supply function can, therefore, be specified as a function of family income and of individual wage rates of family members. Since these are not very strongly correlated among family members separate estimates of income and substitution effects are feasible and were obtained for the first time.
>
> The problem of timing of labor supply responses applies to secondary (intermittent) earnings in families, as the family head is assumed to be specialized in continuous market activity. This problem is analyzed in terms of the distinction between permanent and transitory levels or changes in income and in terms of fluctuating family demands for household production. The empirical estimates were obtained in a variety of data sets, including micro-data sets, area averages, and

time series. In a simplified formulation, the labor-supply function for married women was specified as a function of family income, own wage rate and other variables such as education, unemployment, and fertility. The findings showed negative income effects, that are a reduction of market work resulting in an increase in leisure, but not necessarily by the same amount of time. The substitution, or wage effect (with income held constant) was positive and in contrast to the previous conjectures of a 'backward-bending' supply curve, it exceeded the negative income effect, being almost double the latter in absolute value. Thus, the net effect of women's wages is positive, and therefore, consistent with the upward trend in wives' labor-force participation, as the secular rise in income and in wages was roughly parallel. The previous contradictory findings in cross-sections turned out to be due to a misspecification in which substitution variables were left out.

An answer to the question why the substitution effect was so much larger for wives than for husbands rests on difference in non-market activities, full-time market activity of husbands left less time for non-market activities mainly of a leisure type. For wives, household production was the major alternative to market work, a much more substitutable activity for market work than is leisure.

This brief summary does not explain what made the paper so influential. Perhaps the main reason is the role economic theory plays in this paper as a guide to empirical estimation. Empirical theory served in Long's study merely as backdrop scenery. Mincer builds a theory of his own on the Robbins foundations, and theory and empirical estimation are strongly intertwined.

The Robbins static ''two-sector'' model is abandoned for a more realistic model where the family faces a three-way choice between paid work, unpaid work and leisure. The static one-period model is replaced by a lifecycle framework. Mincer does not present a formal model where labor supply functions are derived from a utility maximization scheme. (Mincer's reluctance to engage in theoretical analysis is one of the reasons his collaborations with Gary Becker were so productive), but the lack of a mathematical formulation does not diminish from its power. The new theory serves as the scaffold on which Mincer builds the empirical estimation. The interplay between theory, data and empirical estimation made this paper the object of emulation.

12.4. DATA AND EMPIRICAL METHODS

Mincer's basic model can be formulated as

$$m = \beta_p \gamma_p + \beta_t \gamma_t + \gamma w + u$$

where m denotes married women's labor supply, γ_p – the household's permanent income, γ_t – the household's transitory income and w – the wife's wage rate. It is assumed that $\gamma_p = x_p + w$, and $\gamma_t = x_t$ where x stands for husband's earnings. Throughout the analysis the measure of labor supply (m) is labor force participation.

The observations are always aggregate or grouped data, and m measures the group's participation rate (in percentage points).

To estimate the basic relationship and isolate the parameters β_p, β_t and γ a wide variety of sources is used: The 1950 US Census of Population, several current Population Reports ranging from 1955 to 1958, and a special sample of white husband-wife families derived from the 1950 BLS survey of Consumer Expenditures. The choice of data source is never accidental, and the data are always tailored to the theory.

In the absence of panel data (which were non-existent at the time), the major challenge posed by the cross section surveys was the separation of permanent and transitory earnings. To isolate the effect of transitory earnings and estimate the wage effect, Mincer follows Long and uses the SMSA means. Using a sample of 57 Northern SMSAs derived from the 1950 census, he argues that the community averages can be interpreted as approximations of the long-run levels, and hence should yield unbiased estimates of the long-run wage effect (γ) and permanent income effect (β_p). The OLS estimate of the wage effect proves to be positive and to be twice as large as the negative income effect, leading Mincer to the conclusion that the supply of labor of married women is positively sloped (in sharp contrast to the backward bending supply of labor of males). The positive wage effect, observed for the first time in cross section studies, seemed to be the clue to the secular increase in married women's labor force participation.

The second theme of the paper is the claim that cross-section studies tend to inflate the importance of the negative income effect because they do not separate the permanent income effect (which is also relevant for the secular change) from the transitory effect, which does not affect the secular trend. Unfortunately, the transitory component of measured income is unobservable and Mincer has to rely on circumstantial evidence to evaluate its effect. It is here where the researcher's ingenuity substitutes for "hard" data. To isolate the transitory effect, he employs several tests.

The first test focuses on the effect of husband's schooling on their wives' participation, where husband's earnings are held constant (at a low level of earnings). Estimating $m = b_1 x + b_2 s$, where s denotes schooling, and $x = x_p + x_t$ and it is assumed that $\partial x_p / \partial s > 0$. Observing a positive schooling effect ($b_2 > 0$), the finding is interpreted as support of the hypothesis $|\beta_t| > |\beta_p|$. An increase in husband's schooling, accompanied by an increase in his permanent earnings should have led to a decline in wife's participation unless it is offset by the stronger effect generated by the decline in transitory earnings.

A second piece of evidence is provided by a comparison of the participation rates of women married to men working only part of the year and those married to men working the full year. Since the two groups do not differ in the husband's weekly wage rate, the difference in husband's earnings is due to temporary constraints on his supply of labor. The increased labor force participation of women married to men working only part of the year is interpreted as a reaction to their husband's increased negative transitory income.

The elasticity of participation with respect to transitory earnings is derived from the partial regression coefficient of participation on weeks worked, where earnings are

held constant. Defining $x_p = 52\ w_h$, where w_h denotes the husband's wage rate, and given that observed earnings $x = nw_h$, where n stands for weeks worked, transitory earnings equal

$$x_t = x - x_p = (n - 52)w_h.$$

Estimating $m = b_1x + b_2n$, the coefficient b_2 reflects the relative magnitudes of the permanent and transitory earnings effects. Given earnings, the greater the permanent component, the smaller the transitory component of earnings. A negative coefficient of b_2 is, therefore, indicative of a negative transitory earnings effect that exceeds the negative permanent earning effect.

At that time the current population reports of the Census Bureau (as well as the decennial censuses) were published in the form of one-way, or less frequently, two-way tables. As Mincer himself attests:

> These gross relations between labor force rates and the classifying variables are manifold and bewildering. A literal reading of such relations as separate effects of the particular classifying variables is confronted with puzzling differences among various sets of cross-sectional data and leads to apparent contradictions with time series.

But the ''puzzles'' and ''apparent contradictions'' do not discourage him. They rather seem to invigorate him. A battery of tests is applied to these crude data to show that the wage effect offsets the permanent income effect, and that the transitory earnings effect on participation exceeds that of permanent earnings. The cruder the data the more sophisticated the tests employed.

Mincer borrows the Friedman's consumption function technique to interpret the gross effects that he observes. The numerous variations on the same theme attest to the author's artistry. He examines the wives' participation rates by their own schooling and the husband's income, their participation by husband's labor force status and age, by husband's occupation and earnings. He compares the participation rates in the survey week with the long-run work experience (i.e., years worked since marriage), and the effect of husband's earnings with and without children. In each case he is able to find the special angle that will allow him to separate the permanent income effect from the transitory effect and the income effect from the wage effect. By the end of the day, Mincer provides almost 20 pieces of evidence to support his hypotheses–a productivity record given the paucity of the available data.[3]

12.5. THE AFTERMATH

The dictionary defines ''aftermath'' as ''1. a result (especially, a disastrous one); 2. a new growth of grass''. In this case clearly the second definition applies. Mincer's 1962 paper dominated the literature of labor supply throughout the 1960s. The two most comprehensive studies of the topic in that decade, Glen Cain's study of the labor

force participation of married women (1966) and William Bowen and Thomas Finegan's study of the US labor force (1969) were written in the Mincer spirit. It took a decade before the Mincer assumptions came into closer scrutiny.

Mincer, as already mentioned, never bothered to write down a formal model. Using labor force participation rate as a measure of labor supply, he explained: "In a broad view, the quantity of labor supplied to the market by a wife is the fraction of her married life during which she participates in the labor force. Abstracting from the temporal distribution of labor force activities over a woman's life, this fraction can be translated into a probability of being in the labor force in a given period of time for an individual, hence into a labor force rate for a large group of women "(Mincer 1962, p. 68).

Thus, according to Mincer, the choice of timing, given the lifetime probability of participation, is random. It was Yoram Ben Porath (1973) who questioned this assumption, arguing that one cannot abstract from the temporal distribution of labor force activities over a woman's life.[4] He points out that an alternative explanation for the differences in participation behavior of observationally identical individuals is unobserved differences in the value of home time. If this is the case, regressions of labor force participation on income and wages will not reflect the Hicks-Slutsky income and substitution effects, but rather the distribution of the value of time at home (i.e., the distribution of the reservation wage). Heckman (1978) denoted the two alternative hypotheses "*the life cycle model of labor supply*," and the "*one period model of labor supply*."

This distinction played an important role in the development of the analysis of labor supply in the 70s. Gilbert Ghez and Becker (1975), Heckman (1976), and Sherwin Rosen (1976) rose to the challenge to explain the life cycle profile of labor supply in a framework of consumption, investment in human capital and earnings.[5] This line of theoretical work led to Thomas MacCurdy's (1981) empirical model of labor supply in a life cycle setting. It is worth noting, however, that all these studies dealt primarily with males, and the timing of women's labor force participation (so closely related with the timing and spacing of child birth) has received a much less satisfactory theoretical and empirical treatment.

Which of the two explanations is more realistic is, of course, an empirical question and triggered several investigations (Yoram Ben Porath 1973; Heckman and Robert Willis 1977; Mincer and Haim Ofek 1982). Even those who rejected Jacob's version of the life cycle model and estimated the participation function to trace the distribution of the reservation wage, adopted his terminology, interpreting the results as the distribution of the housewives' value of time (Gronau, 1973a, 1973b; and Heckman, 1974).[6] This emphasis on the unobservable gave birth to the extensive literature on self-selection biases, and the proper way to isolate potential differences in the unobservable variables. Needless to say, this topic still generates heated controversies today.

A second offspring of Mincer's paper is the class of family supply models. Orley Ashenfelter and Heckman (1974) tried to estimate separate supply functions for husband and wife in a family context. Their specification of (what is called nowadays)

a ''unitary'' utility function defined over consumption and the husband and wife home time, was the forerunner of a whole new literature on family utility functions. The latest manifestation of these are the ''collective'' models of labor supply (Pierre-André Chiappori 1992, 1997).[7]

Mincer's model of a three-way allocation of time between leisure, work at home and work in the market, and his analysis of married women as dual job holders (at home and in the market) were generalized by Becker, using a multi-activity framework (1965). It took a decade before it was formalized in its original three-way partition (Gronau 1977).

Mincer's quest for reconciliation between the time series trends and the cross-section elasticity estimates did not end in 1962. He returned to the topic in 1985, this time heading an international ''task force''. The study was based on the experience of 11 countries (the US, UK, France, Spain, Germany, The Netherlands, Sweden, Italy, Israel, The USSR, and Japan). Mincer's introduction to the JOLE volume reporting these studies summarized the diverse experiences, and resolved at least some of the puzzles in the international data.

Finally, the entire empirical work of the 1962 paper was based on aggregate or grouped data. Even where disaggregate data were available – i.e., the 6,766 consumer units derived from the 1950 survey of Consumer Expenditures, Mincer had them stratified into 24 cells according to the husband's schooling, age and employment status. The participation rate in each cell was regressed (using OLS) on the explanatory variables. Mincer's study preceded by five years Thomas Lisco's first use of Probit in empirical studies in economics.[8] Six more years passed before Probit was used in the study of labor supply (Gronau 1973a). The use of disaggregate data and the adoption of non-linear models of bivariate choice allowed for a much more accurate measurement of the explanatory variables, and a much richer set of explanatory variables. All these developments made Labor Economics the testing ground for new econometric techniques. They made, perhaps, some of Mincer's ''art'' obsolete; they did not diminish, however, from the profound insights of his seminal paper.

NOTES

1. Lest it is argued that the ratio of post/pre Mincer papers reflects just the obsolescence of knowledge (or memory censoring), Glen Cain's 1966 study of the labor force participation of married women cited only 18 previous studies of labor supply. It may also be argued that the explosion of publications on the topic of labor supply reflects the sharp increase in the number of economic journals (and, specifically, journals specializing in labor economics). I would argue that the increase in the number of journals is a natural supply response to the increase in demand.
2. Twenty-two years later, in his comprehensive study of the U.S. labor force in the 20th century John Durand (1968) attributed the increase to ''the autonomous influence of the development of custom'' and ''the succession of generations as a mechanism of change.''
3. The Consumer Expenditure sample used by Mincer included 6766 observations. For comparison, a recent paper on the effect of children on their mothers labor force participation (Joshua Angrist and William Evans 1998) was based on two samples of over a quarter of a million observations, each. (The observations were restricted to mothers with two or more children.)
4. Gregg Lewis questioned Mincer's implicit assumptions six years earlier, but he kept it to himself (1967) (and to few privileged Spanish readers, 1968).

5. These studies owe as much to Mincer as they owe to Ben Porath's (1967) study of the optimal investment in human capital.
6. This work was, of course, also influenced by Mincer's later study on the opportunity cost of time (1963), and Becker's theory of the allocation of time (1965).
7. This literature gained impetus following Becker's path-breaking *Treatise on the Family* (1981).
8. Lisco (1965) employed probit to study modal choice in his study of the demand for transport.

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