NBER WORKING PAPER SERIES

SCHOOLING, ABILITY, NON PECUNIARY REWARDS, SOCIOECONOMIC BACKGROUND and the LIFETIME DISTRIBUTION OF EARNINGS

Paul Taubman*

Working Paper No. 17

CENTER FOR ECONOMIC ANALYSIS OF HUMAN BEHAVIOR AND SOCIAL INSTITUTIONS
National Bureau of Economic Research, Inc.
261 Madison Avenue, New York, N.Y. 10016

November, 1973

*University of Pennsylvania. The research reported herein was performed pursuant to a grant from the National Science Foundation to the NBER for research in the area of income distribution. The opinions expressed herein are those of the author and do not necessarily reflect the views of the National Science Foundation.

I. Introduction

All individuals or families do not receive the same income or earnings. This inequality, the most indisputable fact about the distribution of income, has been found in capitalist and socialist economies, in democratic and dictatorial countries, and in Biblical through modern times. There are other characteristics of the income distribution that are nearly as well documented for modern countries. For example, the distribution is not symmetrical but has a longer right-hand tail , and both average income and its variance generally increase with education and age.[1]

Why inequality occurs and why the distribution has its particular characteristics is a matter of concern to many people. Certainly society and government have expressed a desire to establish a minimum floor for members of society - though the level of the floor and the means of achieving it are matters of debate. Besides a direct interest in the questions of the sources of inequality, how to achieve income redistribution and the efficacy of various policy tools, economists are also concerned with establishing how various labor markets operate, how rational individuals are, and how important are individual effort, chance, and predestination.[2]

Spurred on by these questions, economists have constructed various theories that purport to explain the income distribution. Some aspects of these theories have been tested against empirical observations.[3] This study will extend the range of such tests. In addition, we will generate some new facts that a complete theory should be able to explain.

---

[1] For international comparisons see Lydall[30]. For the U.S., Miller[33].

[2] These terms will be defined more rigorously below.

[3] See, for example, Mincer [3].

The Personal Distribution of Earnings

Personal income is equal to the sum of labor earnings, returns to capital, and transfer payments. Transfer payments are determined by political and societal forces and will not concern us in this study. While the distribution of income from capital is partly determined by economic forces, it will not be the primary focus of this study - partly because of the paucity of data in our sample. Earnings from work, to which the introductory statments on inequality also apply and which will be the primary focus of our study, currently constitute about two-thirds to three fourths of national income.

Most theoretical and related empirical work on the distribution of earnings fall into the "human capital" or "stochastic" theory categories or a blend thereof. The human capital model assumes that people are paid a wage equal to their (real) marginal product which varies over individuals because of differences in inherited or acquired skill levels. The stochastic theories assume that an individual's earnings over time depend on the cumulative history of random events.

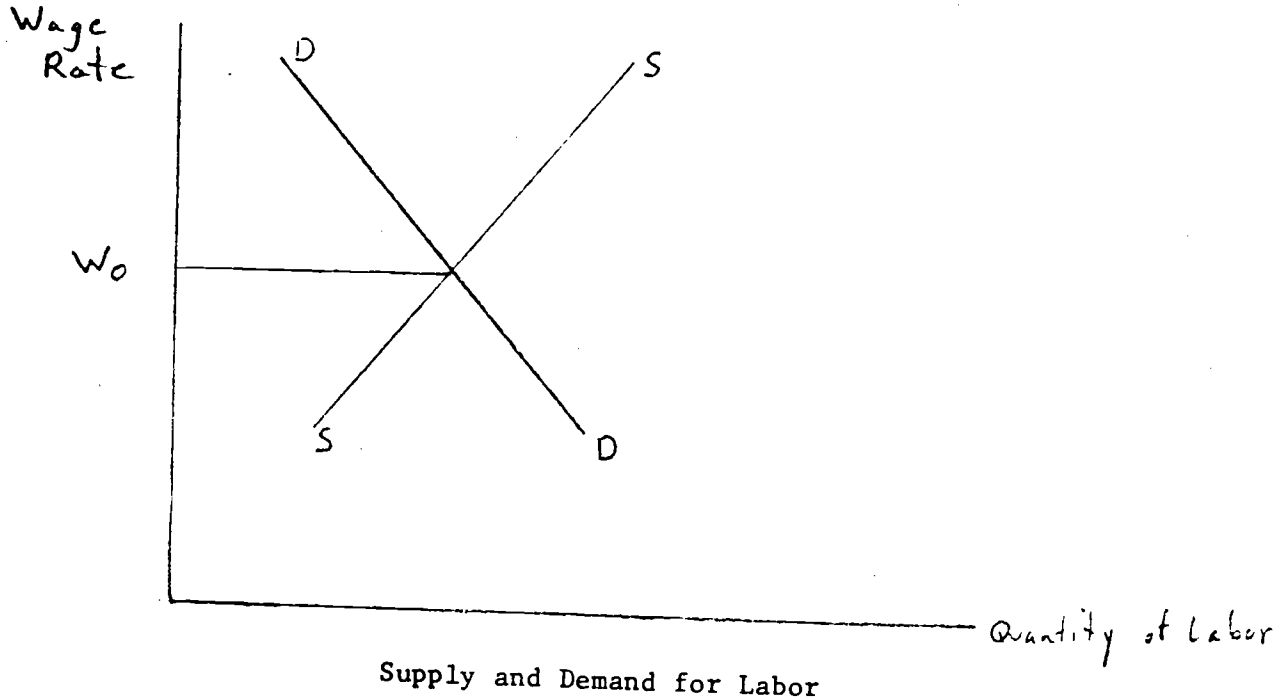
II. Supply and Demand for Labor

A traditional method of analyzing labor markets is via supply and demand curves. Suppose for the moment that all people are homogeneous with respect to skills that determine earnings. Assume that with a given quantity of capital and other factors of production, the marginal product of labor decreases as the number of employees increases. In a competitive labor market (with no on the job training) employers will hire that number of workers at which the marginal product is equal to the real wage rate, W/P(for convenience we will set P at 1 and henceforth speak of wages only). This demand curve is

given at DD in Figure 1.

In Figure 1, the supply curve for the population is SS which is assumed to slope upwards because it takes higher wage rates to induce people to forego leisure. The equilibrium wage rate of W_o will clear the market and everyone who works the same hours will earn the same amount. This conclusion, which is, of course, contrary to fact depends crucially on the assumption that each person has the same skills but this study is to a large extent based on the proposition that many different skills - inherited and acquired - help determine earnings. It is fairly easy, however, to incorporate many types and levels of skills into the above analysis <u>if what is known as an "efficiency units" model is valid</u>. Suppose individual one, who has a particular complex of skills, is designated the "standard" person. Let capacity be designated as C. As long as C_j/C_1 <u>always</u> equals b_j we can state that the j^{th} person is equivalent to b_j standard workers.

Figure 1



Supply and Demand for Labor

Since the employer would be indifferent to hiring person 1 at a wage of say W_o or person j at wage of b_jW_o, the demand curve in Figure 1 can be redrawn in standard worker units. The supply curve can also be drawn in efficiency units as $\Sigma_j b_j Q_j$ where Q_j is the quantity of labor the j^{th} person would offer at a particular standardized wage rate. In this efficiency model a person who is 110 per cent of standard capacity will always receive a wage 110 per cent of the standard wage, but the equilibrium level of the standard wage will vary with the supply and demand curves.

An important set of questions that arise with this model are: what particular skills determine capacity; are these skills inherited or acquired; and, is the quantity of acquired skills consistent with the amount economists would define as optimum? Before considering these questions, however, we will examine briefly a model in which relative capacity, C_j/C_1, is not fixed but varies.

The world of work is subdivided into many different occupations which are associated with different tasks and levels of responsibility. For example the Dictionary of Occupational Titles differentiates thousands of occupations. Some occupations and tasks require physical strength, some mental ability, etc., and some require combinations of particular skills. A person's relative capacity may remain constant within an occupation but vary over occupations.[4] Thus a person's observed or effective relative capacity would depend on the occupation he would work in which in turn depends in part on the occupational wage structure which can vary

---

[4] Even this need not be true. For example, different types of skills may be more or less important depending on the types of machinery used.

over time. Though this model is complicated in principle it is still possible to formulate and solve it as a general equilibrium model, in which individuals choose that occupation which yields them the highest income or utility.[5,6]

One particularly important feature of this occupation-skill model is that some skills may not be at all useful in some occupations. Suppose for example the only two occupations are manager and manual worker and that intelligence received such a high wage in managerial work that all people with an I.Q. above 110 are managers. Assume also that physical strength is of no importance as a manager but that among manual workers strength increases capacity while I.Q. doesn't. Finally assume all those with I.Q. greater than 110 have above average strength (though the correlation is not perfect). Then for people with I.Q. above 110, variations in strength would not affect earnings while for those with lower I.Q.'s and less strength only variations in strength would affect earnings. Thus in this example each skill is redundant in one occupation and only a portion of the distribution of each skill determines earnings. This analysis, of course, suggests that it may be necessary to examine earnings functions

---

[5] Tinbergen [47] has formulated this type of model and Reder [32] has examined some features of such a model though he uses somewhat different terminology.

[6] Indeed the usual general equilibrium models admit of the interpretation that each individual is a separate factor of production because he has his own bundle of skills.

within occupations and that in the whole sample the effect of a skill may have upper and lower limits.

We will return to this question but for now let us return to the simpler efficiency units model. At the end of our previous discussion of this model we raised certain questions about what skills determine earnings or capacity. At a general level we can classify these skills as cognitive, affective, physical, and psychological. Cognitive skills include learned facts and information, as well as recall and decision making abilities. Affective skills include leadership, and social behavior. Physical skills include strength, coordination, and dexterity while psychological skills include extroversion, reaction to stress, and degree of neuroticism, etc.

At this stage of our knowledge, we hardly know which particular skills determine earnings or capacity since no sample contains reliable measures of all feasible skills and few samples contain direct measures of even a representative skill from each of the categories mentioned.[7,8] However, several studies have shown that certain aspects of intelligence and of leadership are valid. See Taubman-Wales [46], Griliches and Mason [18], Wise [31], and Featherman [15].

---

[7] Indeed for some possible skills, appropriate measures have not yet been designed.

[8] Perhaps the Terman sample [ ] contains the most information but it is small and limited to people with I.Q.'s (as children) of 140 and over. The Project Talent [37] and to a lesser extent the Little-Sewell [27] sample have more skill information for the period when their respondents were in elementary and high school, but currently little in the way of earnings data since the people graduated high school no earlier than 1958.

Suppose, however, that we had measurements on an exhaustive list of skills for each individual. We could then estimate an earnings equations such as

$$(1) \qquad Y = aX_1 + bX_2 \ldots cX_n + u$$

where Y is earnings, $X_1 \ldots X_n$ are the N measures of skill, and u is a random error representing "luck" or institutional phenomena.[9]

Each coefficient in the equation indicates the effect on earnings of increasing the associated X by one unit. It is worth noting that the coefficients may not be stable over time. For example suppose there is a big increase in the supply of any X. In the efficiency units model, this will lead to shifts in the supply curve (in efficiency units) and a decrease in the standard wage rate which in turn would decrease all coefficients proportionately. In more complex models, the effect on the coefficients of an increased supply in any one skill level depends upon the individual supply and demand elasticities for each skill as well as cross

---

[9] As equation 1 is written, all skills have an independent, linear effect. This representation was chosen for simplicity. Interactions between skills should not be assumed away in empirical work especially because Roy [63] has demonstrated that if skills affect earnings multiplicatively, symmetric skill distributions yield asymmetric earnings distributions--an important feature of the observed distribution. See also Mandelbrot [31].

elasticities of demand. But in general the coefficients will not change proportionately.[10]

While estimation of equation 1 with many skills would represent a major achievement, our task would not be over since we would then want to know what determines the level of each X or what policies could affect the distribution of earnings.

Inherited and Acquired Skills

The level of any skill or attribute a person possesses at any point of time is determined by his genetic endowments and by his environment.[11] As we are using the term "environment," it includes all post-conception events that influence the individual. Thus it encompasses formal and informal training for all the skills discussed earlier, pre-natal diet, expenditures on health which determine whether skills can be used, and random events. A huge literature has been devoted to assessing the relative importance of nature and nurture for particular skills and attributes.[12] As we come closer to estimating equation 1 this literature

---

[10] There is one other special case to note. It is possible that only skill differences relative to the average matter, e.g., the brightest lawyer may receive twice as much per case as the average lawyer. If all lawyers received more training and increased their legal skills X per cent, none may receive more earnings. However, the effect on earnings on legal brightness between lawyers should be given by the coefficients in (1).

[11] The genetic effect can be both direct and indirect. For example a persons knowledge level can depend on innate ability and on educational attainment which is partly determined by innate ability.

[12] See for example Jinks and Fulker (21), Burt (8), Cavelli-Sforza (9), or Mittler (37).

will become more important in economics, but at the current time, it does not seem necessary to summarize it. It is worth noting, however, that the relative importance of nature and nurture can vary over time as the distribution of genetic endowments and of environment changes. In particular new environments such as better schooling, day care centers, and prenatal diet could have large effects even if nurture was not important for older cohorts.

Training

Since we have not measured all the possible skills nor know their nature-nurture combination, we will not estimate equation 1. We will, however, make use of a modified procedure. Suppose each of the X_j's is represented as a function of genetics and environment. If for example

(2) $$X_{ji} = c_j G_i + d_j N_i$$

where G is genetic endowments and N is environment, and i is the individual, we can then rewrite equation 1 as

(3) $$Y_i = \Sigma_j a_j c_j G_i + \Sigma_j a_j d_j N_j = e_i G_i + f_i N_i$$

Equation 3 represents progress primarily because we do have measures of several aspects of environment (as well as a few G's as approximated by I.Q.).

People learn or increase their skill levels in many ways with some methods better for some skills than others. However some of the most important "training" institutions are the family, peer group, school, military, and work.

The family can affect the child's cognitive, affective, physiological and psychological development by a variety of subtle and obvious means including: the behavior and attitudes of parents and siblings; material and nonmaterial goods and services provided to the child; love and affection; and degree of permissiveness in rearing. It would be most useful and convincing if we could incorporate measures of parental behavior, love, material goods, etc., in our equations. We don't have such information and are reduced to using proxies which are more or less crudely related to the true variables we wish to include.

There are several difficulties in interpreting the coefficients of a proxy. A proxy, by definition, is assumed to be correlated with the true but unobserved variable. But the proxy may be insignificant, though the phenomena it tries to represent is important, because the proxy is too crude a measure, i.e., has too low a correlation with the true variable. Alternatively the proxy used may be correlated with several true variables whose separate effects we may be interested in. For example, fathers education may be related to his earnings, his methods of child rearing and certain genetic (and thus partially inheritable) abilities.[13,14] Fortunately if several proxies are used, it can be shown that each proxy will tend to reflect the underlying variable to which it is most highly correlated.[15]

We will use proxy variables such as family income and wealth, religion, urban or rural residence, parents' education and occupation , which are all often available and made use of. We will supplement this list with other

---

[13] See Kagan [22] for the last. Some of the former are discussed in Sewell, et al.

[14] The child will get one half of his genes from one parent and in a world without either assortive mating or dominant and recessive genes will on average regress towards but not reach the mean of innate ability.

[15] See Crockett [13] "Technical Note."

proxies that we think are related to child rearing techniques and family atmosphere. It is worth emphasizing that family status coefficients in an earnings equation only represent the direct effect of such status. Generally, there is also an indirect effect since family background helps determine the level of educational attainment (and other parts of "environment") a person acquires.

The peer group can also affect the amount of schooling a person acquires and can directly affect all broad skill categories through its attitudes and reward structure, but we have little or no data on the peer group.

Both sociologists and economists have incorporated formal schooling into the earnings equation. For reasons that will be clear later it must be emphasized that schooling can affect cognitive, affective, physiological, and psychological skills though there is no reliable information on which of these changes determine earnings.[16] The most common though obviously very crude measure of education is years of schooling. However, following the lead of Solmon and Wachtel (77) who used the same sample, we will also incorporate certain measures of college quality.[17]

The Army may make men but we will not study the question in this book since all the people were in the military. While all the people in our sample worked, the amount and type of work and of learning on the job has varied by individual and can affect earnings. Indeed a major innovation in the earnings distribution literature is Mincer's theory of investment

---

[16] For evidence on some noncognitive effects as well as the mechanism by which education causes these changes see Simon and Ellison (72).

[17] A problem with many of these measures is that they seem more related to cognitive development than the other skills. However certain information on type and size of college may be related to noncognitive changes.

in on-the-job training, which is described below in more detail and subject to empirical verification in Chapter __.

Human Capital Theory

The economic definition of capital is any thing that will yield benefits over some future period. While under this definition a person's genetic inheritance is as much "capital" as is financial inheritance, the economic literature on human capital has relegated this "conceived stock" to a secondary role and concentrated on schooling, health expenditures and other means by which a person can acquire or maintain skills. In part this emphasis occurs because if a person must invest to acquire a set of skills, it is possible to ask both what factors determine how much investment a person will acquire, and what the optimal amount of investment a rational person should make in any time period. In addition it is difficult to obtain measures of the elements of the conceived stock (with the partial exception of intelligence).

It is possible to examine the consequences of an investment function on the level and distribution of annual and lifetime earnings with due allowance for the distribution of the inherited abilities as is brilliantly done by Becker [5], and by Mincer [35].
Becker's schooling model assumes that each dollar spent on education--through tuition, government subsidy, or earnings foregone from not working--will increase skills, attributes, etc. These new skills and attributes will yield both a new, constant level of earnings and nonpecuniary returns to the individual. Becker then asks what the distribution of earnings

would be if each person were a rational investor who is certain of his yield from education.[18] Assuming that nonpecuniary returns are zero, Becker shows that the equilibrium conditions is that $r_j = m_j$ where r_j is the marginal rate of return on and m_j the financial cost of schooling for the j^{th} person. Becker assumes r is subject to diminishing returns and varies with the person's ability while m is assumed to increase with education and depend on family resources.[19] Becker then derives the earnings distribution under alternative assumptions and shows, for example, that the distribution can be skewed to the right. The particular answer, however, depends on the distribution of (the functions of) m and r and their covariance.[20]

This schooling model assumes that the extra earnings from education would be constant over time but in fact extra earnings increase with age. Within the context of the human capital model, these changes could be due to maturity (with an interaction with education) but available evidence would suggest that from age 20 to 50, maturity per se is not important for changing the level of most cognitive and affective skills. Mincer however has demonstrated that the human capital analysis can account for

---

[18] Or is risk neutral if there is uncertainty.

[19] This may not be as true in our sample since the G.I. Bill provided for tuition up to $500 a year and a stipend of $100 a month. These payments in effect reduce the interest rate to zero and sharply reduce tuition and forgone earnings.

[20] For example he concludes that the distribution depends on the correlation of r_j and m_j (over individuals).

a rising age-earnings profile, which vary by education level, if people invest rationally in "general" on-the-job training (OJT).[21] By definition, general training is that which is as useful to other employers as the one giving the training. But since training is embedded in the worker, after being trained he can offer his services to any employer (in the absence of enforceable long-term employment contracts). Therefore in a competitive labor market the employee would receive wages equal to his new, higher marginal product, or in other words all the benefits of the training.

The model, at this point, is indistinguishable from a learning by doing model. Mincer, however, takes the analysis one very important step further. Specifically Mincer argues that a person will choose that occupation which offers him the largest amount of lifetime earnings, discounted to the present. Suppose therefore that occupation A involved training and occupation B did not. Also assume that initial wages were the same in both occupations, hence, occupation B would offer the larger discounted stream.[22] In this case workers would leave B for A and new entrants would choose A. As the supply of workers for A increased and B

---

[21] His model can also explain a changing age profile of the variance of earnings.

[22] The occupation definition in this case is broader than in our normal use since it encompasses a whole occupational career moving from stock boy to president.

decreased, the starting wages in A would drop and those in B rise. This adjustment would occur till the discounted value of the lifetime earnings stream would the same. Note that as a result of the adjustment process, wages in A initially will be below those in B and later above. The (unobserved) drop in wages in the first year of work is the investment in on-the-job training in that year.[23,24]

Denote $\bar{Y}$ as the individual's earnings with no learning by doing and λ_t as the percentage of earnings invested in any year. Mincer generally assumes that λ declines with years of work. One form he often uses is:

$$\lambda_{jt} = A_j e^{-bt} \tag{4}$$

where A is a scalar that varies over persons, b is the decay rate that is the same for all persons, and t is the time since beginning work.

---

[23] The rational investment in human capital concept can be applied to any portion of the environment which produces or maintains skills. For example one interpretation of the observed effect of family SES on earnings (education, mental ability, etc. constant) is that more and better training that augments earning related skills occurs in families with a higher SES. But the rational investor model would suggest that parents allocate their time so that at

$$\frac{MU(X)}{MU(Y)} = \frac{P_x}{P_y}$$

where MU is marginal utility, X is the (discounted value) of the child's extra earnings from a unit of parent's time, while Y is any other use of time, and P_x and P_y are the respective prices.

[24] In calculating the investment costs in other years, an adjustment would have to be made for returns on prior investments.

Depending on the investment function, Mincer derives a human capital earning function such as:

$$(5) \qquad \ln Y_t = \ln\bar{Y} + eS + ft$$

where S is years of schooling, e is the rate of return on S, f is the rate of return on OJT and $\bar{Y}$ is determined by genetic endowments and the other elements of the environment that affect skills and earnings.

Another way to view Mincer's model is that earnings only change over time because of continued investment in the on-the-job training.[25] His earnings model, therefore, can be rewritten as:

$$(6) \qquad Y_t = \bar{Y}\,(1+r\sum_{n=1}^{\infty}\lambda_{t-n} - \lambda_t)$$

where λ is defined above and $\bar{Y}$ is the constant stream, determined by genetic endowments and all aspects of environmet except OJT. As long as λ decreases over time, earnings will increase with age. Mincer, moreover, demonstrates that in his model the variance of Y_t and of log Y_t need not be constant over time but may increase or decrease monotonically or even follow non-monotonic paths.[26]

---

[25] This is not quite true in the sense that Mincer allows for transitory events in any year and for maturation and senescence. But these can be ignored at this point.

[26] See [36] pages.

Mincer's theory is in the tradition of much of economic analysis of competitive markets and has the attractive feature of being consistent with such observed regularities as rising age earnings profile and with nearly any age profile of the variance of earnings. Moreover as Mincer has noted it is possible to obtain estimates of e and f, the two rates of return, within a decade of individuals entering the labor market.

While the model has all these advantages, it has several particular disadvantages. First of all, the model assumes that because of individual actions the market always generates the type of equilibium he makes use of. But consider for a moment the informational requirements necessary for this market to function. On the schooling side the individual must estimate the expected increase in his earnings for each year of his working life.[27] This is a formidable task--especially if education interacts with characteristics such as drive or particular types of innate ability in producing earnings capacity.

For the OJT investment model, the worker has to be able to calculate the increase in skills or the general learning by doing contained in any occupation. In addition in both instances the worker will have to estimate if the current information that he can obtain, say from Census data, is applicable to the future or if an equilibium situation is about to become disequilibrium or vice versa. These are severe

---

[28] If the person is not risk neutral, he will also have to examine the variance (or other measures of dispersion) of the extra earnings. If Mincer's model is correct only the constant earnings difference, $\Delta\bar{Y}$, need be estimated but the worker would need to read Mincer to know how to calculate this figure from available data.

informational requirements which may result in labor market failure, i.e., the market may not act as predicted.

Even if the information requirements are met, equation (5) may not hold nor be interpreted as above because of nonpecuniary returns to education. That is, evidence at least as reliable as that on earnings indicates that education has nonpecuniary rewards. Similarly, the OJT model should allow for such nonmonetary returns as pride and status as, e.g., in the professorial labor market. Yet the rational investor model requires these nonpecuniary returns be included in the r that is to be equalized to m. Thus the coefficients on S or t in an earnings equation need not equal the rate of return on investment.

Finally the models assume that a unit of schooling or OJT always emits the same capacity as a person ages and that variations in earnings, with wage rates fixed, must reflect changes in capacity from maturation, illness, or OJT, etc. As explained below such an assumption seems invalid for some labor market situations.

It is difficult to construct a definitive test of the schooling model because nonpecuniary returns and the individual's cost of financial capital are seldom known. It is possible, however, to test Mincer's OJT theory since as expressed in (6) his model predicts that those below average in earnings early will be above average later and will have a faster growth rate in earnings. Below we will expound on this in greater detail and perform the indicated tests.

Sorting and Signaling Models

There are some occupations such as fruit picker and commissioned salesman, in which it is possible to determine quickly and cheaply the marginal product of an individual worker and in which the success or failure of one worker does not determine the marginal product of other workers in the firm. In these occupations, a firm should be willing to set a piece rate and hire anyone who applies for a job. There are other jobs such as a position on an assembly line in which it may be possible to determine the number of bolts tightened and not tightened by a worker but where the failure of any one worker on the line will reduce or destroy the output of other workers. In this interdependent situation, the firm would be able to measure a person's marginal product, but as long as it can not collect for the destroyed units the firm may find it profitable to try to minimize the number of people with less than the necessary skill level needed for the job. Finally there are some jobs such as manager in which it is difficult to measure both the actual and potential productivity of any worker and in which there are interdependencies. Here again the firm may want to sort people into groups which have more or less of the skills associated with success on the job.

Within most firms there are a number of "career leaders" within the semi-skilled, skilled, and managerial-professional categories with some possibility of going from one ladder to another. When the firm does not know a person's productivity and when a complex and difficult to measure

set of skills are needed for success, it is possible for firms to use various "signals" to assign a person to a particular job and then monitor his performance to determine whether to retain, promote or fire the person. The sorting model suggests that the extra earnings from education need not be constant over time even if his potential capacity is. This is especially true if Mayer and Lydall's observations on span of control, capacity and hierarchical organization are valid.

While the firm learns of the individual's talents, the individual can also receive training and knowledge which is specific to the firm.[29] As shown in Becker (4) part of specific training shows up in higher wages of the trainee. Specific training can occur in a world without signalling. But the chance to acquire or the capacity to benefit from specific training may be related to position in the firm, which is dependent on signalling.

The sorting and signaling models, which can be based on profit maximizing behavior, would still imply that earnings depend on inherited and acquired skills but the coefficients would have different interpretations than in the Becker-Mincer model. The models also have different implications for the relationship between annual and life-time earnings since those who are more skilled will always have above average earnings.

Taste for Risk and Nonpecuniary Rewards

The models we have been examining explain earnings by differences in skills. It is possible, however, to explain some features of the distribution by differences in tastes towards work or nonpecuniary returns from work. Friedman (16) for example, has suggested that skewness arises because while most persons are risk averse, some people are risk lovers.[30] Those in the

---

[29] Several people including Arrow (2) and Spence (45) have examined signaling models. Taubman and Wales have constructed a test for the use of education as a signal and have concluded that perhaps one-half of the educational earnings difference are due to increased producitivity produced by education and the ramainder is due to signaling on in their terminology screening. In a sense the sorting model is implicit in some Markov schemes, but Wise has explicitly made use of such a sorting model to explain how earnings may vary with education. Reder has also suggested that the amounts and types of firm specific training may vary by type of job while signals are used to allocate people to initial jobs.

[30] Alternatively he has also suggested that people are risk averse to small changes but are willing to gamble to achieve major gains.

latter group may initially choose an occupation in which there is a small chance of a very high income. Since success is not won overnight, eventually we observe some of these who succeed and over time the average earnings of the winners grows more than those who were risk averse. There is no corresponding group of people with large losses because, as Lebergett (28) points out, the inept (risk lover) generally can't raise enough financial capital as the succesful one. Lebergett, in fact, presents some evidence that for the nonselfemployed the earnings distribution is nearly symmetric--though of course this need not follow from the above model since there are some risky salaried occupations such as stock broker.

Friedman's model is closely aligned with that of von Neumann Morgenstern in which a person bases his decisions on the expected value of the utility of a set of outcomes, defined as $\Sigma P_j\ U(Aj)$ where P_j is the probability of the A_j event occurring and U(Aj) is its utility. Consider two alternatives A and B where A has only one possible outcome A_1 and B a whole set but an average outcome $\bar{B}$. Suppose A_1 equals $\bar{B}$. Then it can be shown that if person has diminishing marginal utility he will attach more utility to and choose A. In other words he is averse to risk. Alternatively if his marginal utility exhibited increasing returns, he would be a risk lover and choose B in the above example.

While in principle it is possible to conduct controlled experiments in which people choose between various alternatives to try to determine a person's utility function and degree of risk aversion, we do not have that option. Instead we will use a question dealing with preferences for employment versus self-employment and desire for job security. Certain problems inherent in the use of these questions will be discussed later, but one is important enough to merit attention now. Most people implicitly assume that an individual who is risk averse in one activity such as managing his financial portfolio will be risk averse in all activities (Friedman need not assume this since he has the same individual as risk averse and risk loving depending on the span of the outcome). This is a very restrictive assumption that one suspects is not true. The word"suspects" is used because most examples that come to mind of apparent contradictions, e.g., college professors with conservative financial portfolios engaged in risky research on the frontiers of knowledge, incorporate opportunities as well as taste. In other words the expected payoff from this risky research more than compensates for bearing the risk. Still the author is uncomfortable with a once risk averse, always risk averse model.

The difference in average earnings of the risk averse and those neutral towards risk can be thought of as a nonpecuniary reward, called peace of mind, received by those who dislike risk. There can be many other positive and negative nonpecuniary rewards attached to jobs. Those rewards are important in our study of the determinants of the earnings distribution because nonpecuniary rewards can induce offsetting changes in monetary rewards.[31] The choice between pecuniary and nonpecuniary rewards can be treated in the general framework of utility maximization. It is possible, however, that tastes or the parameters of the utility function are partly determined by family background or by education in which case the extra earnings attributed to say education are inadequate as a measure of the total returns to education if tastes are also included in the equation.[32]

There are also substantial problems in quantifying the trade-offs between monetary and nonmonetary returns. The two major difficulties are determining which of all possible nonpecuniary returns are relevant and second measuring differences in preferences. In the data set we are using we haveonly a few possible nonpecuniary rewards to examine and have not had to choose. Our measures are crude and relate primarily to whether a particular reward was operative at a time of occupational choice. The many problems associated with these measures are discussed in chapters

Luck

With the partial exception of Friedman, the above theories assume that earnings reflect individual differences in skills or tastes. Some economists have suggested that the earnings distribution at a point of time reflects the cumulative history of luck starting from an initial distribution based on skills. For example one version of these theories can be expressed as:

$$(6) \quad Y_t = Y_{t-1} + e_t = Y_o + \sum_{k=o}^{t} e_{t-k}$$

where e_t is random error that is uncorrelated with Y_{t-1} and all other e_{t-k}'s.

---

[31] For example, reasoning from personal introspection, some economists have explained thusly the low earnings (and rate of return on educational investment) for Ph.D.'s and theologians.

[32] See for example [47] and McConnell, Trow and Yonge. [12].

In these models Y_o can be determined by skill levels but over time these skills should become less important determinants of earnings and the distribution should approach that of e_{t-k}. Depending on certain assumptions - including if Y_t is replaced by $\ln Y_t$ - the stochastic theories can generate (asymptotically) lognormal, Pareto or other skewed to the right earnings distributions.[33] Below we will see if the implied assumptions on the distribution of the growth in earnings are correct. Also we will test the proposition that systematic determinants become less important as people age.

III. The NBER Sample

In this study our empirical work will be based primarily on the 5,100 men in the NBER-TH sample. In this chapter and associated appendices, we will discuss the main features of the sample and give an overview of the distribution of earnings in several years.[34]

The sample was drawn from a group of some 75,000 men who during 1943 volunteered to enter the army air force's pilot, bombadier and navigator training progam. The people in this group obviously had to meet the health and physical requirements to be in the Army. Also according to Thorndike and Hagen (TH) to enter this program, "a man first had to be single, be between the ages of 18 and 26, pass a fairly rigorous physical examination, and pass a screening aptitude test, the Aviation Cadet Qualifying Examination.

---

[33] See Champernowe [10], Aitcheson and Brown [1], or the excellent survey of Mincer [35].

[34] Much of the descriptive material is drawn from Taubman and Wales, Chapter 4 and from B. Wolfe's unpublished dissertation [46, 52]

This examination was primarily a scholastic aptitude test, though perhaps with a slightly technical and mechanical slant. The qualifying score on the screening test was set at a level that could be reached by approximately half the high school graduates, the country over."[35] The men who qualified and volunteered for the program were then given a battery of some seventeen tests which measure various types of mental and physical skills. These test scores as well as certain biographical information on hobbies and family background determined which of the men were accepted for the Air Cadet program.

Thorndike and Hagen decided in 1955 to undertake a study of the usefulness of the seventeen tests in predicting vocational success with the hope of being able to aid the vocational counseling and choice of high school students. They drew a sample of 17,000 men who had taken a given battery of tests between July and December 1943. Beginning in late 1955 and throughout 1956, TH received responses from some 10,000 civilians and 2,000 men still in the military. The questionnaire they used, which is reproduced in Appendix B, contains among other things an earnings occupation history from World War II to the date of the questionnaire. It is important to note that because of their vocational emphasis, much care and attention was paid to assigning occupation codes.[36]

In 1968 Taubman and Wales(TW) contacted Professor Thorndike and learned that he had retained a printout of the test scores, earnings and a few other items for 9,700 people who were civilians in 1955 and the

---

[35] Thorndike and Hagen, [4 8], pp. 8 and 9.

[36] See their description on pp.

completed questionnaires for about 8,600 of these men. With the concurrence of the air force, Professor Thorndike kindly agreed to make available all this information as well as the address list as of 1956.

It was recognized almost immediately thatit was possible to update addresses via army serial numbers and the V.A.'s life insurance and claims file.[37,38] Thus John Meyer and Thomas Juster of the NBER quickly agreed to conduct another interview using Bureau funds. This questionnaire, which is reproduced in Appendix B, was eventually answered in 1969 and early 1970 by some 5,100 out of about 7,500 people for whom good addresses were available.[39] TW initially used the detailed information on education, ability, family background, and personal characteristics from the two surveys (for about 80 percent of the men) to examine the rate of return to education and the use of education as a screening (signalling) device.

The respondents had been promised summaries of the results of the questionnaire. When mailing these summaries in 1971, the NBER included a short questionnaire to try to resolve some of the puzzles raised by TW and others. Some 3,000 people responded to this one mailing. When funding was received from the NSF for this project, another large questionnaire dealing with more aspects of family background and other matters was sent out and was returned by 4,474 people.[40] These last two questionnaires are also given in Appendix B.

---

[37]The V.A. graciously provided new addresses at no charge.

[38]Additional updated were obtained by checking phone books of the city of the last known address.

[39]Initially we had felt that 2,500 responses would have qualified this survey as a success.

[40]The N.S.F. funds also enabled the NBER to extract more information from the TH questionnaire including the details on the job and earnings history.

In a moment the sample will be compared with the U.S. population of the same cohort. But first we wish to note that TH found little in the way of response bias in 1955 - perhaps because they employed expensive means such as the Retail Credit Corporation - to locate men. Taubman and Wales have shown that in 1969 the mentally more able and educated were more likely to respond. However, TW also showed that there was no significant difference in the 1955 earnings equations between those who did and did not respond in 1969; thus, the data can be used for structural analysis.[41]

Sample Characteristics

The qualifications needed to be a potential member of this sample quarantee that the NBER-TH sample will not be representative of the U.S. male population of the same age. About one quarter of the men fall into each of the categories of high school graduate, some college, bachelors degree, and at least some graduate work.[42] Also a person had to be in the top one half of the I.Q. distribution to enter this program and the average ability level has been heightened by the aforementioned response bias.

The average age in 1943 was 21 with three quarters of the men aged 19-22. At least in 1943, the programs' qualifications assure us there men were, on average, in better mental and physical health than the U.S.

---

[41] For the post 1969 questionnaires we have adopted the practice of including a "no response" dummy variable. Since this tends to be significant over time the more successful are continusing to respond more.

[42] This is a much better level of education than among World War II veterans - even if we restrict ourselves to high school graduates. See Miller [34].

male population aged 18 to 26. Given that these men volunteered to train for flight duty, it seems likely that they areless risk averse than the population as a whole, which may be a partial explanation of the high percentage of people who are self employed in 1969.[43] We do not know how many nonwhites if any are in the sample though the education and test aptitude qualifications suggests to us that whites probably make up 99 percent of the group.[44]

In her dissertation B. Wolfe has compared this sample and the corresponding U.S. age cohort of white males on a number of characteristics. She finds a higher percentage of Jews and smaller percentage of Catholics in this sample. The men in this sample have fathers with above average education (and occupational status) and father-in-laws with even higher educational attainment. Also the people in this sample have above eaverage earnings in each year studied , even if the comparison is made with white males of the same education and age with the differentials greater at a later age and at lower levels of education (where the sample is less representative of the population. See below, or T.W., chapter 4).

It is of some interest to compare the earnings inequality in this sample with that of the random sample of white males aged 45-59 (in 1966)

---

[43]The high percentage may also be due to the availability of V.A. guaranteed loans, better financial position of parents and in-laws, or business competence.

[44]However, several of the highest ranking black Air Force generals in 1972 were in the Air Cadet program in World War II.

studied by Kohen, Parnes and Shea [25]. They find for example that the share of total family income received in 1968 by the bottom 25,50 75 and 95% is 14,35,62, and 89% respectively. In the NBER-TH sample each of the corresponding figures are smaller by 5 to 6 percentage points. Thus despite having a more restricted range in mental ability, education and risk aversion, the NBER-TH sample has more inequality in family income than a nationwide cohort of about the same age. This result may be due to the heavier concentration of self employed in NBER-TH or to the heavier concentration of people in the NBER-TH in the right hand tail of the earnings distribution.

Clearly the sample is not representative of the U.S. population and in the case of education and I.Q., does not have any members of a large portion of the population. Moreover some of the dimensions in which it is nonrandom will be shown to be related to earnings. The nonrepresentativeness and truncation of some variables will mean that the distribiton of earnings should not correspond to that for the U.S. population. Still the sample can be thought of as a random stratified sample in which the weights for various strata do not correspond to the population weights.[45] It is well known that such unequal weighting will not affect the unbiasedness of coefficients estimated from the data. Thus we can use this sample to study the effects of education, ability, etc. on various aspects of inequality. We can not, however, extrapolate the results to those levels of education

[45] The reader is reminded that TW rejected the hypothesis of a success bias over and above the response bias by education and ability level.

and ability not included in our sample. And as noted above measures of inequality, such as variance, should not be the same as in the population. However, such inequality measures calculated within education and ability groups or the changes in the measures over time can apply to the population.

IV. A Summary of the Determinants of Earnings at Various Points of Time

This section is designed to summarize the results of earnings equations for 1955 and 1969, presented in the appendix, by comparing the relative importance of various variables both at a point of time and over time. It is important to realize that we are discussing partial regression coefficients in which all other variables in the equations in the appendix have been held constant.

In examining these results the reader is reminded that our underlying theoretical model is that pecuniary and nonpecuniary rewards depend on a person's marginal productivity. The various skills and talents that determine productivity as well as tastes towards risk and nonpecuniary rewards are partly inherited and partly acquired from schools, friends, family, etc. We would like to determine both the skills or processes that determine earnings and their relative importance. We also wish to quantity the trade offs between monetary and nonmonetary earnings.

Several measures of importance can be used. In this section we will be primarily concerned with those related to the range and the variance in earnings. Later we will consider issues connected with skewness and kurtosis. An obvious measure of importance is the R^2

or the amount of the variance explained by the set of variables.[46] Of course the R^2 in our sample may not generalize to the U.S. population because our sample is truncated in education and ability and is drawn more heavily from some strata than others. Since we do not know all respects in which this sample differs from the U.S. population nor how to extrapolate the results to the truncated portion of the population, we will not try to calculate a weighted R^2. Many of these problems are less severe when we compare total or partial R^2's for the same people but in different years.

The variance explained by a set of independent variables combines two elements - the predicted value of the dependent variables, Y_i, as compared to the mean of $\bar{Y}$, and the number of times each Y_i occurs. An alternative measure of importance is the difference in the average level of earnings, Y_1-Y_2, caused by a set of variables. This range measure is related to the $Y_1-\bar{Y}$ portion of the variance but does not indicate how many people are at each Y_i.[47]

For ease of exposition, we will discuss the 1955 and 1969 results for one variable at a time. Unless otherwise noted, these results are drawn from equations in which many other variables have been included.

---

[46] It is well known that it is difficult to measure the contribution of one variable versus another to the total R^2 when the independent variables are not orthogonal.

[47] However, the range and variance only indicates the direct effect of a variable. There can also be indirect effects, for example, parental income can determine educational attainment.

The variables which have been held constant include: education, mathematical ability, various measures of socioeconomic background of the respondent and of his wife, information on self employment and on teaching, a crude measure of risk preference, age, and work experience, health, hours worked marital status, and attitudes towards nonpecuniary rewards. We never explain more than 45% of the variance in earnings. Some of the unexplained variance must be due to unmeasured but systematic variables. The coefficients of any included variables will be biased if it is correlated with any omitted variable which determines earnings.[48]

Because of computer capacity limitations, we were forced to drop some variables which were consistently nonsignificant in preliminary runs. In the equations presented, therefore, all the variables are either significant in one or more years or were significant in either the next to the last runs or in the Taubman-Wales (TW) equations from which this analysis commenced. When we cite coefficients for variables not in the last equation, the numbers are taken from the most complete versions of the final equations in which the variable appeared.

Formal Education

Formal schooling can affect physical, cognitive, psychological, and affective skills.[49] It would greatly increase our understanding of

---

[48]Formally, if the true equation is $Y = X\alpha + Z\delta + u$ where u is a random variable, the expected value of the ordinary least squares estimate of δ obtained when Z is omitted, is : $E(a) = \delta + E(X'X)^{-1}XZ\,\delta = \alpha + \beta\delta$. β is equal to the coefficient in $Z = XB$. The bias is $\beta\delta$ which is zero only if β or δ is zero.

[49]See, e.g., Simon and Ellison[42], or Yonge, McConnell et al[12] for some evidence on the noncognitive developments.

Table 1

The Increase in Earnings from Education in 1955 and 1969

rcentage Increase from ucation for Average High hool Graduate, Not Self ployed, if Obtained and :ended the Quality of .lege of the Average :son with Just Some College.	Time Period		
	1955 Average Age 33	1968 Average Age 46	1969 Average Age 47
Some College	05%	08%	08%
Bachelors Degree	11%	25%	20%
Some Graduate	08%	22%	18%
Masters Degree	06%	23%	29%
Ph.D.	13%	32%	43%
L.L.B.[a]	06%		53%
M.D.[a]	71%		82%

Source: Equation 2 in Table

[a]: In equation this variable was also included in Ph.D. group. Moreover these are salaried people only.

* Not Significiant at the 5% level.

The variables in the equation which have been held constant include: education, mathematical ability, various measures of socioeconomic background of the respondent and of his wife; information on self employment and on teaching; a crude measure of risk preference, age and work expereience health, hours worked, marital status, and attitudes towards nonpecuniary rewards.

how and schooling does if we would identify the particular skills that affect earnings and measure the change in all skills produced by schooling. But since we do not have such measures nor even knowall skills which should be measured, we will have to ba satisfied with crude measures of quantity and quality of schooling.

We represent quantity by level of education obtained. We use dummy variables for various responses. Earnings in 1969 generally increase with education. But despite our having included variables to hold constant nonpecuniary rewards including those associated with pre college teaching, risk preference, and self employment, those with just a bachelors degree earn more than those with some graduate work. As shown in table 1 the increase in earnings from education for the average high school graduate ranges from 8 percent for some college to 82 percent for non self employed M.D.'s with bachelors degree holders receiving 20 percent more.[50,51] (We have standardized by the average non self employed high school graduate's earnings of $10,300).

Essentially the same percentage increases are obtained from equations using the log of earnings. If we adopt Mincer's model [36], these percentage

---

[50]These calculations assume that all post high school graduates attend a college of the average quality of people who had only had some college. The quantity effects are slightly larger when quality is omitted, but never by more than $200.

[51]If self employment variables were not included the increases would be: 14 percent for some college; 28 percent for bachelors; 80 percent for L.L.B., and 110 percent for M.D.'s. These increases are less than those given in TW primarily because of the introduction of self employment variables though the graduate level coefficients were much smaller before we introduced some variables related to nonpecuniary returns.

changes divided by the associated number of years of education beyond high school are an estimate of the rate of return from education which is less than 6 percent at all education levels.

In 1955 the same general pattern emerges except that the effects of education are uniformally smaller - for example, obtaining a bachelors degree or some college would add 11 and 5 percent more to the $6,000 (1958 prices) received by the average non self employed high school graduate - and not always statistically significant. However, our self employment variables are onlymeasured in 1969. The resulting measurement error has probably caused us to overstate the relative returns to education of the not self employed in 1955.[52]

The total effect of education may be understated if one of the mechanisms by which education alters earnings is measured after the completion of education and is also included in our equations. One such route would be the occupation the person was in. The variables on occupation we have used in these equations are teacher, self employed businessman, and professional, and business assets. The teacher variable is included because we felt that teachers receive more nonpecuniary rewards as a substitute for earnings than is received in other occupations.[53] The various self employment measures are designed to eliminate all of the return on financial capital included in the earnings estimate; rewards for bearing the extra risk of

---

[52] When the self employment information is omitted the 1955 differentials are: some college 11 percent; bachelors degree 14 percent; L.L.B. 14 percent and M.D. 82 percent, which are very close to those given in T.W. If we adopt Mincer's interpretation of the log equation, our estimates of the rate of return to education are less than 5 percent (except M.D.).

[53] However, the variable could mean that on some unmeasured aspect of the ability, teachers are less able.

entrepreneurship; and perhaps unmeasured attributes that lead to being a successful businessman. However, it is possible that these measures have incorporated some of the influences of education. If these variables were not included, the bachelors, some college and masters degree coefficients would all be smaller.

It is also possible that a person's tastes for nonpecuniary rewards or risk bearing are partially formed by education. The inclusion of the so called nonpecuniary variables caused the some college and bachelors level coefficients to decrease and the graduate level coefficients to increase in both years.

College Quality

As a crude measure of college quality, we have included for each person's undergraduate school the Gourman Index (of Academic Quality) which is described in more detail in chapter 4 in [46]. Because the index is scaled arbitrarily, we initially included it and its square in the equations. Since these two terms together are never significant and do not explain more of the variance of earnings than the linear term, we use only the linear term.

In 1969 we find that attendance at a school that ranked 100 points (the standard deviation) higher in the index is associated with a $450 increase in earnings. After our usual standardizing, the effect of the 100 point difference in college quality of 4½% is about half the size of the effect of obtaining some college. In 1955 a 100 point increase in undergraduate school quality leads to a $140 increase in earnings or 2½% after standardization. Once again this is about half the size of

Table 2

Increase in Earnings in 1955 and 1969 from Ability Differences

Percentage Change in Earnings from Ability (Bottom 1/5 to 1/5th Shown Divided by the Not Self Employed High School Graduates Average Earnings)	Time Period	
	1955 Average Age 33	1969 Average Age 47
2nd 1/5th	05%*	05%
3rd 1/5th	05%	07%
4th 1/5th	09%	14%
top 1/5th	14%	19%

* Not significant at the 5% level.

The variables in th e equation which have been held constant include: education, mathematical ability, various measures of socioeconomic background of the respondent and of his wife; information on self employment and on teaching; a crude measure of risk preference, age and work experience, health, hours worked, marital status, and attitudes towards nonpecuniary rewards.

the coefficient on the some college variable.

It is interesting to note that the introduction of the quality variable causes a 5% to 10% reduction in the coefficients of the Jewish, year of first job, attendance at private high school and attendance at private elementary school variables as well as a 10% increase in the pre college teacher dummy in 1969 and smaller changes in 1955. These shifts are indicative of the fact that college quality can be both determined by (or correlated with) and act as a proxy for other personal attributes that determine earnings. The quality index may still be acting as a prxoy for unmeasured attributes but we would hnpe that it in part measures the extra value added imparted by better schools.

The quality index used is obviously not the only one possible but we have not studied this problem in detail since it is the focus of the work of Wales [59], and especially of Solmon [43].

Mental Ability

In TW it was found that the seventeen tests taken by the people in 1943 contained at least four factors, but only the first factor which was denoted mathematical ability but which probably correlates well with a standard I.Q. measure, was a significant determinant of earnings.[54]

In both 1969 and 1955 we tested for an interaction between mental ability and all other variables by computing separate equations within each ability fifth. Using analysis of covariance, we could not reject the hypothesis that the effects of all variables, including education, were independent of the level of ability in each year.

---

[54]No attempt was made here to reinvestigate the usefulness of the other factors. Since we convert the test score data into dummy variables for the different fifths of the factor score distribution, we are assuming that post test taking events (not otherwise measured) do not change the fifths of the ability distribution a person would belong to in each of the paricular years studied.

In both 1955 and 1969 as shown in table 2 the coefficients on each of the top four fifths are significant. These coefficients are not sensitive to the inclusion of the self employment related variables.[55] The effectsof each fifth increase in ability adds a greater percentage to earnings in 1969 than in 1955, with the differences more pronounced in the top two ability fifths.

The numbers in Table 2, which are divided by the average earnings of the not self employed high school graduate, can be compared directly with those in table 1. Thus the average difference in earnings between those in the top and bottom fifths of ability (14 and 19% in the two years) exceeds the effect of obtaining a bachelors degree in 1955 and is nearly as large in 1969.

A person's test scores generally depend on his innate ability, the quality and quantity of pre test schooling, and differences in other aspects of "environment." Often we would like to know what portion of test scores (and associated earnings) are due to genetics and to environment. Suppose that the measures of religion, parent's and own educational attainment, occupation, and income etc., included in our earnings are the only environmental differences that determine test scores, then ability coefficients in the earnings equation would be net of the environmental influences.[56] Of course, if other aspects of environment

---

[55] Since people had to be in the top one half of the ACGT to be able to volunteer for the program, these fifths are more like tenths.

[56] If this true equation is Y = a (innate ability) + bX but we estimate Y = a*(innate ability + cX) + b*X,, then our least squares estimate of a* and b* are identical to those for a and b - ac.

affect test scores, the ability coefficient will still be a mixture. We examined the genetic/ environmental problem in [47] and conclude that in the tests we are using most of the variation in scores is due to genetic differences(or other nonmeasured dimensions of environemnt). This finding in no way tells us innate ability is more important than learned knowledge since we have not examined the effects of various types of learned knowledge on earnings.

Since the sample only includes the top half of the I.Q. distribution, it seems safe to conclude that ability is a more important direct determinant of the range of earnings than education for those who are at least high school graduates. Even when self employment information is not used, the same conclusions are reached though the differences are smaller.

Family Background

An individual's "socioeconomic background" can determine earnings for a variety of reasons including being a proxy for : genetic endowments; differences in "training" which increase cognitive, affective, physical and nonpecuniary rewards; and business contacts, "pull" and nepotism.

The measures of family background we have analyzed include: father's education and occupation; mother's education and labor force participation; wife's education and her parent's education and occupation; various data related to family income, wealth, and size while the respondent was growing

Table 3

Increase in 1955 and 1969 Earnings Associated with Various Socioeconomic Measures

Percentage Increase in Earnings compared earnings of the average, non self employed high school graduate, from differences in various SES characteristics	1955 Average Age 33	1969 Average Age 47
Father's Education		
Attended High School	6%*	7%*
Attended College	4%*	5%*
Father's Occupation		
Business Owner	2%*	5%*
Teacher	1%*	-8%*
Mother's Education		
Attended High School	3%*	3%*
Attended College	2%*	4%*
Family Never Moved before H.S. Grad.	-1 *	-5%*
Jewish	33%	40%
Protestant	-3%*	-9%
Religious School Several Times/wk.	-9%	-11%
Never Went to Religious School	-.1%*	-3%*
Biog 2nd Fifth and Biog 3rd Fifth	4%	05%
Biog 4th Fifth and Biog Top Fifth	11%	08%*

Table 3 (conti'd)

SES Characteristics	Percentage Change in Earnings 1955	1969
Father-in-law Education(per year)	1%	1%
Mother-in-law High School or College	-1%*	6%
Private Elementary School	4%*	27*
Private High School	25%	29%
Time Spent on Sports[c]	4%*	10%
" " " Chores[c]	-3%*	-10%
" " " Hobbies[c]	3%*	-6%*
" " " Part-Time Job[c]	5%	11%

* Not significant at the 5 percent level.

[c] Difference between spent most time and hardly any time.

The variables in this equation which have been held constant include: education, mathematical ability, various measures of socioeconomic background of the respondent and of his wife; information on self employment and on teaching; a crude measure of risk preference, age and work experience, health, hours worked, marital status, and attitudes towards nonpecuniary rewards.

up; how the respondent spent his time while growing up, age at entering school and religious preference.[57]

In TW the two measures of SES used were father's education and the so called biography variable. This biography variable is based on the respondent's family income and education, his hobbies, sports and interests, and his pre test education and grades as reported in 1943.[58] The weights of this index are based on how well the items predicted success in pilot and navigator school.

It was, of course, a bit frustrating that a variable made up of so many disparate items with unknown contributions determined earnings. Thus we are happy to report that inclusion of information collected in 1969 and 1972 similar to that collected in 1943 has substantially reduced the size of the biography coefficients, but the top 2 fifths are still significant and the coefficients are monotonic. It is interesting to note that the big shift in the 1969 and 1955 coefficients occurred only after we included information on tastes towards nonpecuniary rewards and a proxy for family wealth, implying that these are the components in the biography variable that influenced earnings. The differences between the top2 and the bottom fifth are 11% and 8% in 1955 and 1969. This is

---

[57]This is a wider list than that used in most previous studies, and some of the variables require justification as SES measures but almost all of these variables are significant in 1969 and 1955. Several of the variables have been used at one time or another by others; see, for example, Blau and Duncan [6], and Sewell et al [41].

[58]The original items, which were collected by the military, are not extant though much information has been recollected in 1969 and 1972.

one of the few variables that has a smaller percentage affect in 1969.

Additionally, the effects of father's education are reduced to insignificance in both 1969 and 1955. Part of the reduction of the importance of this variable occurs when the father is an owner variable is introduced. But the reduction in the size and significance of the coefficient is primarily associated with the introduction of the respondent's business asset variables. Since this variable is not often used in other studies, there is a suggestion that father's education is a proxy for family wealth and business ownership.

There are other SES variables which are significant. Perhaps the most interesting of the new measures are the Jewish and Protestant variables.[59] Compared to Catholics, (as well as aetheists, agnostics and others who all earn about the same amount in the various years), Jews received from 33 to 40 percent more earnings than the average high school graduate and Protestants from 3 to 9 percent less.[60] The reader is reminded

---

[59] In 1969 the respondents were asked to indicate their religious preference by checking one of Protestant, Catholic, Jewish, None, Other. It is possible that different answers would have been obtained if "the religion you were raised in" was asked. Compared to the U.S. white population the NBER-TH had 1.7 percent more of both Jews and others and 5 percent fewer Catholics. However, the differences from white males in the particular cohorts who were at least high school graduates would probably be smaller.

[60] If self employment and M.D. are not held constant, Jews earn even more. The asset variable is measured imperfectly, but it is difficult to attribute a difference of $4,000 a year to this. There are relatively few aetheists and agnostics and others.

that these differences are not of the influence of education(including M.D.) mental ability, self employment, and various other personal attributes and family SES dimensions.[61]

At least for the generation being discussed, it seems likely that those who are Jewish had more of a taste for acquiring knowledge and as shown in chapter achieve more education and go to better schools, given ability and other SES measures.[62] Hence for given levels of schooling and mental ability in 1943, Jews may have acquired more knowledge useful in earning a living.

We cannot, however, rule out the possibility that some unmeasured genetically determined characteristics are related to religion. Unfortunately, since we do not know what nonmeasured attributes are important determinants of earnings, we cannot usefully examine the genetics literature to see what if any differences exist by religion.

---

[61] In a study of college graduates of the first half of this century, Hunt [20] also found similar qualitative results. Also using the same basic data source as Hunt, Haverman and West [19] found that being Jewish was the most important determinant of earnings of people who graduate college in the first half of this century. Featherman [15] also found Jews to earn more and some Catholics, such as French, to earn more than the average Protestants. Both the Hunt and Featherman studies hold constant education and mental ability as well as other variables.

[62] For example, Bruce Eckland, "Academic Ability, Higher Education and Occupational Mobility" American Sociological Review, 1965, pp. 735-746 [14] finds that for given test scores and social class, Jews go to higher quality institutions for learning. This would indicate either higher tastes for education, more motivation and drive, or lower costs relative to returns. He also finds certain ethnic groups of Catholics to do better than the average Protestants. Given the education cutoff to be in the program, it seems likely that our Catholics come heavily from these successful ethnic groups.

We also cannot rule out the possibility that the Jews and other nonProtestants are a more select group of their respective populations. However, given the nature of the Air Force work they volunteered for, it might be argued that those who volunteered could include more people who wanted to gain revenge on Germany or to inflict destruction in large doses quickly. But the revenge motive would seem to suggest that Jews and to a lesser extent Catholics would be a more random (less select) group of their religious compatriots.

That religious upbringing or the different environment in families or various religions can mold the individual receives some further support in the sample. That is, we find that those who remembered attending religious classes (not parochial school) several times a week earn 9 to 11% less than those who attended once or twice while those who did not attend earn 1 to 4% less.

Another set of variables which reflect both the type of family and affective, physical and cognitive, and psychological attitudes that can be formed by the family and peer group is contained in the question (asked in 1972) of " indicate how you spent your time while growing up".[63] The categories examined were sports, hobbies, chores, part time job, reading and other. The last two groups were never significant and will not be discussed here except to note that reading is related to the ability measure and educational attainment. The remaining categories were significant in

---

[63] 1 is for practically no time spent and 5 is for the most time spent.

1969 but only part time job was significant in 1955. The difference in earnings of those who spent practically no time and the most time on part time jobs is 5% and 11% in 1955 and 1969. It seems likely that the men who came from poor families needed money for themselves and/ or valued financial success greatly. Thus these men would be willing to work hard and apparently have succeeded with success being cumulative over time.[64]

In 1955 and 1969 those who spent much time on sports while growing up, earn 4 and 10% more than those who spent practically no time.[65] Several explanations of this result are available. First, activity in sports may show up in later life as better physical fitness and as shown below healthiness is related to earnings. (in this explanation 1955 has a smaller impact because of less health deterioration at that age). Second, most sports involve both a competitive and cooperative structure which are also found in many work situations. That is, a boy's play is training for the man's work. Third, activity in sports may be indicative of energy and aggresiveness that pays off in the business world.[66] Finally, there is some indication in Thorndike and Hagen

---

[64] If we are right about the type of families these men came from, I would expect them to have a high rate of time preference , and less access to capital early in their lives; thus, I would find it hard to interpret the growth in earnings over time to an investment theory as in Mincer.

[65] It is doubtful that this result is due to people becoming professional atheletes since it was primarily baseball players who were highly paid then (and Ted Williams was in the Marines) and the sports which recruit from college graduates would have had to gamble on rookies aged 25 or more.

[66] Related to this last viewpoint is the idea that people who play sports may be more able to make decisions quickly. If intellectualism is taken as evidence of the opposite personality, it is interesting that the Phi Beta Kappas among top management earn substantially less than other people. See Taubman-Wales[76] appendix on Llewelen.

that in 1955 that sports distinguishes company presidents and vice presidents from treasurers. This suggests that sports in the 1920's and 1930's was an indicator of family wealth and availability of leisure time, or an indicator of attitudes such as risk taking.

The hobby variable has practically no effect in 1955 but in 1969 those who spent the most time on hobbies received 6% less which is significant at the 10% level in the final equation. The most obvious explanation for this finding is thatmany though not all hobbies represented the opposite of sports and that the effects should be reversed.

The last and perhaps most difficult of these to explain is the chore result. Those who spent much time on chores earn 3 and 10% less in 1955 and 1969 with the former not significant. Initially I had expected chores to be a proxy for "willingness to take on responsibility" and to have a positive effect. Merton[32] however, argues that families who insist on their children doing chores are lower middle class and are very interested in conformity. He further argues that these families will produce "tame" individuals who make the ideal bureaucrat and who receive less earnings than people in riskier jobs (see below). I might add that Merton only refers to one piece of empirical evidence which, he acknowledges, is not very compelling.

As might be expected time spent on chores and on part time job are positively correlated (R^2 = .13) but the differences in emphasis of paid and family work reflect different types of environment and different types of men.

Thus far we have included SES measures which are strongly related to family upbringing and taste formation. Parental income or wealth can also influence a child's earnings by being used to purchase goods that produce marketable skills, by being a proxy for nepotism, or by being a proxy for genetically determined skills.

One possible proxy for family income is father's education, which we have already indicated is not significant once business assets are included in the equation. Another possible proxy is father's occupation but this also does not explain directly much of the differences in earnings, with the other variables held constant. There are, however, several caveats that must be attached to this conclusion. First father's occupation, (and resulting income) has an indirect effect on earnings through the amount of schooling the respondent receives. Second and more importantly, father being an owner is significant when the self employment variables are not included. Third, in 1968 father's occupation and education have a much greater impact on the range in family <u>income</u> than on earnings of the <u>head</u>. This suggests that income inequality is perpetuated through generations directly through financial inheritance(including business assets) and indirectly through educational attainment. The biography variable also includes some parental wealth indicators though it's not clear what aspects of the variable determine earnings.

Two extremely important determinants of earnings which appear to be proxies for large amounts of parental wealth, are type of elementary and of high school attended. Those who went to private elementary school

earned 13% more than those who attended public or parochial schools or a combination of schools. (The difference is divided by the earnings of the average nonself employed graduate of high school as is done with the variables). The coefficient on private high school is positive but not significant, probably because 22 of the 29 people who went to private elementary school went to private high school. Thus the elementary school coefficients only measures the extra earnings above private high school. Those who attended both private elementary and high school in 1955 earn 29% more than those who always went to public schools. In 1969 those who went to private elementary and private high school earn 56% more than those who didn't go to private school.

Since private schooling is both different from and more costly to the respondent's parents than public schooling, it might be argued that these results are due to quality differentials. But if this argument is accepted, it is difficult to explain why in chapter neither type of private school is significantly related to our ability measure, which contains some learned knowledge.

Our explanation is that those who went to private elementary schools in the 1920's came from very wealthy families, who provide a good home environment and/or genes or who used pull to aid their sons. The pull argument seems to be the most likely since the variable is primarily a proxy for large amounts of wealth.[67]

---

[67]Indeed when we include a crude measure of net worth in our equations, the private school variables become insignificant and much smaller.

We are still left with explaining the change in the coefficient between 1955 and 1969. I would argue that a screening sorting explanation (as in chapter) is relevant since even if nepotism is involved, you want to see how good the person is before you give him an important job, though of course a person can probably become vice president quicker if his father owns the company.[68]

Another interesting finding in our equations that suggests nepotism is that father-in-law's education, measured continuously in years, is a significant determinant of the respondent's earnings in both 1955 and 1969.[69] A primary explanation of these results is that business and social contacts provided by father-in-law are important. But there can be other explanations. For example, daughters from good social backgrounds may have the necessary graces - not learned in school - which help to promote their husband. Alternatively, women with successful fathers may be able to spot and marry men with those characteristics that made for their father's success, or push their husbands into achieving success.

Interestingly, mother-in-law's education also is positively relate to earnings in 1969 with the high school variable somewhat greater than the college variable, though the two are combined in the final equation. This finding makes it less likely that women are marrying men who are like their fathers and suggests nepotism.

---

[68] In Llewelen's sample of top corporate management, the men who can be identified as related to the family who founded or have controlling interest in 50 or the 70 largest industrial corporations are (the same age as/younger) than the other people in the same or comparable positions.

[69] Dummy variables for father-in-law's occupation and spouse's education are not significant.

Table 4

Age, Experience, and Hours Worked

Coefficients on	1955	1969
Age	.08	-.11
Year of first full time job	-.11	-.15
Hours worked, first job, 1969	-.01*	.07
Hours worked, second job, 1969	-.03	-.12
Weeks lost Illness, 1969	-.03*	-.18

* Not significant at the 5% level.

The variables in this equation which have been held constant include: education, mathematical ability, various measures of socioeconomic background of the respondent and of his wife; information on self employment and on teaching; a crude measure of risk preference, age and work experience, health, hours worked, marital status, and attitudes towards nonpecuniary rewards.

The other dimensions of SES we have tried but found to be insignificant include: whether the respondent was the youngest or oldest sibling, additional crude proxies for family wealth based on type of house, the labor force status of the respondent's mother when the respondent was less than 5 and less than 14 years old; being reared on a farm; size of city or town he grew up in; the region of the country in which raised, and age at time of entry into school. These variables may be insignificant because they are too crude proxies for the underlying mechanism being sought.

Thus far we have been concerned with the effects of individual aspects of SES on earnings. Except for religion none of these has an impact as large as ability or education on the range of earnings in 1955 or 1969. But it is possible for a person to fall into the top or the bottom category of all SES measures. Using the significant coefficients only, the average differences in earnings for such "extremists" would total about $14,000 or 140 percent or the average earnings of the not self employed high school graduate in 1969 and $5,500 or 90 percent in 1955 and far exceed the direct effect of ability or education on earnings.[70]

Maturation and Work Experience

A well-known and documented result is that (real) earnings increase with age till at least age 40. While we do not have data for all ages, the results for 1955 and 1969 certainly are in accord with this finding.

---

[70]This only includes items in table 3, business assets and some other variables may be partly determined by SES.

The general explanations for the upward sloping age earnings profiles are (1) as people age, mental and physical maturation increases those skills that determine earnings,(2)work experience and learning by doing increase earnings related skills,(3) people are promoted on the basis of performance on the job and/or seniority ,(4) beyond a certain age senescence sets in or skills depreciate.[71]

Without distinguishing for the moment type of work experience, time on the job can be represented as TJ = (Age - Year of First Job - H) where H represents such things as time not working because of illness, unemployment and departures from the normal period of time to complete a given level of schooling. If maturation is important than age should have a separate effect from TJ.

Both age and year of first job are significiant in 1969 though apparently senescence or depre ation has set in since age in table 4 is negative, but the separate age effectis nearly zero in 1955. The year of first job coefficient can be treated as the negative of the experience coefficient. Thus contrary to most findings the absolute value of the experience coefficient is greater later in life, i.e., the function from 1955 to 1969 is not concave, even though we have deflated by the CPI. However, between 1955 and 1969 the effect of years experience has only risen about 50% which is less than the percentage increase in average earnings of nonself employed high school graduates or people with

---

[71]It is also possible that age is a proxy for particular cohorts. While most people are within 7 years of one another, the youngest people did not begin work till after serving in the military while many of the older people began work before World War II.

any other education level. That experience is more important than maturity in 1955 is not surprising given the evidence in Mincer. It is somewhat surprising to find large senescence effects in 1969 since the discussion in Bloom[7] suggests little changes in intelligence and other skills before age 50 and since weeks lost through illness have been held constant.[72] However, the results may also be due to discrimination an account of age for those who were fired in 1968 or 1969.

To try to refine the work experience measure, we included information on military service after initial discharge, and type of work experience. We find that the additional military experience data do not explain earnings, perhaps because military experience is a good substitute for civilian experience or because, contrary to the above, experience on the job is not important. In [47] we find that the earlier people enter into high paying occupations, the more they earn in 1969 and that some 1955 jobs are better preparations than others, depending on one's 1969 occupation. These results suggest that some some training is not general and that some people were in wrong jobs in 1955 if they wanted to maximize their lifetime earnings.[73]

Earnings depend on hourly wages rates and hours worked. Unless there is a backward bending supply curve of labor, higher wage rates will lead to greater hours worked and more earnings.[74] In 1969 each

---

[72] Also we have not included those with zero earnings which would include those (if any) retired or unemployed for mental or physical health reasons.

[73] The ranking of occupations is about the same in all years; hence, if you are going to be a manager in 1969, you should choose to be one earlier if you have the option.

[74] Earnings = WH. ∂Earnings/∂W=H(1+σ) where σ=W∂H/H∂W. While this is the usual way of viewing the problem, our equations relate Earnings to H. ∂Earnings/∂H=W(1+1/σ). With backward bending supply curves,σ might be negative.

additional hour per week on the first job adds $70 to annual earnings.[75] If we use an average hourly wage rate per week of $350, i.e., $14,000/2,000 hrs. times 40 hours per week, we would estimate σ in the footnote as about -1.2. Each additional hour on the second job is associated with a $120 decrease in earnings apparently because some of those people with low wages rates want higher material standards.[76] Thus both results, which rely on perhaps erroneous estimates of hours suggests that the supply curve has some backward bending sections.

Despite the fact that the hours data refer to 1969, we included them in 1955. The hours on second job are still significantly negative while the hours on first job have become negative and insignificant. It appears that moonlighters work hard over long periods of time since hours on second job is negatively related to recalled estimates of initial earnings and to wife's working in 1968.

Weeks lost through illness in 1969 has a negative impact on 1969 and 1955 but only the 1969 coefficient is significant. The $180 per week lost would indicate a $9,000 a year job if the figures exclude paid sick leave, but we have no way of knowing if this is how the question was interpreted. Incidentally, this variable caused the self assessed healthiness variable used by TW to become insignificant.

---

[75] However, part of this earnings increase represents the substitution of material goods for leisure. Unfortunately, the hours data which were only collected in 1969, do not mesh perfectly with the earnings data since the earnings in 1969 are those on main job only while we have separate estimates for hours on first and second job. However, the 1968 earnings data, which includes second job, gives similar results so that this caveat need not be important.

[76] Secondary labor force particiipation increases strongly with hours worked on second job (by the respodnent.).

Nonpecuniary Rewards

There are monetary and nonmonetary rewards from a job. Since we expect people to base their job choice decisions on the total of pecuniary and nonpecuniary rewards, those occupations which pay heavily in a non-pecuniary form should have a compensatory change in wage payments. We do not have availabe measures of the nonpecuniary aspects of various occupations, but we do have some crude information related to the preference of individuals on specific nonmonetary aspects of a job. For example the respondents were asked," assuming that you thought that the financial possiblities were about the same, would you prefer to work for yourself or for somebody else or no preference?"[77] In 1955 fhose who preferred to be salaried earn 6% less than the average(nonself employed) high school graduate. See table 5. In 1969 the people who preferred to be salaried earn 11% less. It is important to realize that these results are from equations which hold constant being self employed and amount of business assets.

We are interpreting the answer to the question as indicating risk preference. Is this a reasonable interpretation? We discuss in some detail in [47] how this variable could correspond to an economist's definition of risk aversion. We conclude there that in a formal sense, if respondents thought like economists, the question would distinguish

---

[77] An additional question was asked in which" about the same" was replaced with "slightly favorable if you worked for yourself". This second question was never significant given the first, but the first question always yielded significant coefficients in the earnings equations of variou years.

between risk averters and risk lovers. In a less formal sense people may simply be responding to their belief that this occupation is risky. This question was asked in 1969. It is possible that people who failed in their work now choose the salaried answer because of their failure. But in [47] in chapter we show that this variable is not related to a (self reported) measure of the difference between actual and expected financial success. However, an alternative explanation of the question might be that those who value being their own boss would earn less, especially since those who prefer independence in working do earn less(see below). The results do not support the being your own boss explanation but this may mean that this explanation does not dominate the risk interpretation in this sample. While the results do not prove the risk interpretation result, there is, however, some other evidence that bears on this issue that tends to corroborate it. As discussed in chapters in [47], this same variable determines schooling, the amount of business assets, and returns to capital in a manner consistent with risk preference. Finally it is also worth reporting the variables is significant and has the same sign in nearly all within occupation equations. Moreover, Wolfe in her dissertation [52], has found that those who prefer to be salaried have less children, given income, etc., i.e, appear to be less willing to risk having children.[78]

---

[78]These examples all assume that risk preference is a trait which is exhibited in all acitivites. This assumption may be wrong. For example some college professors may be risk lovers in the field of ideas but risk averters in other matters.

Table 5

Nonpecuniary Trade Offs with Earnings, Relative to Salary of Average High School Graduate

	1955	1969
Prefer to be Salaried	-6%	-10%
Teacher	-10%	-18%
Reasons for Taking 1972 Occup. Field when Started[a]		
Prospects of Future fin. success	-9%	-17%
Chance for Indep. Work	5%*	11%
Person-to-Person Contact	-2%*	1%*
Chance to Help Others	8%	8%
Represented a Challenge	13%	-10%
Job Security	8%	13%
Free Time	-1%*	-2%*

[a] Each coefficient refers to a "no" for an answer ; hence, yes and the no responses are the omitted group

* Not Significant at the 5% level.

The variables in this equation which have been held constant include: education, mathematical ability, various measures of socioeconomic background of the respondent and of his wife; information on self employment and on teaching; a crude measure of risk preference, age and work experience, health, hours worked, marital status, and attitudes towards nonpecuniary rewards.

Another set of questions asked in 1972 was "as best as you can remember, what factors influenced your decision to enter the occupational field you are in at the present time? Check yes or no to each of the following and indicate factors that were of special importance."[79] Since we felt that the first three and last item in the footnote did not represent nonpecuniary job aspects, we did not use them, nor any of the special importance categories. In our equations the dummy variable for each factor used was set at one if the respondent answered "no".

In 1969 the salary, person to person contact, and free time variables were not significant though salary nearly was. The other variables indicate that those who were not worried about future financial success received 17% less than those who were worried (or didn't answer),[80] those not interested in independent work earn 10% more, those who wanted to help others earn 8% less, those who wanted to have a challenge earn 10% more, and those interested in job security received 13% less earnings.[81] In 1955 when many of the people were in different jobs and even occupations, nearly all the same variables are significant and all the signs on the variables significant in 1969 are the same though the magnitude is always less than in 1969.

---

[79]The factors were: type of training in school, type of training in military, personal contacts, salary offered, prospects of eventual financial success, chance to do interesting work, chance for independent work, chance for a lot of person to person contact, chance to help others, represented a challenge, job security, provided a lot of free time, and always liked that kind of work.

[80]The denominator as usual is the earnings of the average nonself employed high school graduate. Ifthe current salary variable answer is included, the coefficient is 10%.

[81]For those who want to try to replicate these findings in other studies, it is important to note that several of the variables, e.g., independence, and helping others, were not significant by themselves but became significant after the financial prospects variable was added to the equation.

Intuitively, all these results seem quite plausible, and each one is internally consistent with one another. But there still is the question of whether these variables are related to nonpecuniary preferences. This issue was discussed in detail in [47] where we concluded that the variables were probably related to preferences. This conclusion is reinforced by the findings in chapters in [47] that the variables have effects consistent with the above interpretation in other equations. Moreover, the introduction of these variables has a big impact primarily on the various graduate education variables, which seems quite reasonable since we often think that Ph.D.'s etc. choose nonpecuniary rewards such as independence in work or helping others.[82]

The basic threads running through these findings are that pepole who are willing to work hard on difficult or risky projects will end up with substantially more earnings while those who are more interested in the intrinsic rewards of the job will receive less. While this is hardly a startling conclusion, I know of no other study which has been able to obtain significant impacts after holding constant such things as education and ability. Moreover, the consistency of findings between 1955 and 1969 suggest that the 1972 survey responses are not expost rationalizations and this is confirmed by the finding in chapter that responses to these variables are not a function of exante/expost differences in monetary success.

---

[82] For a few of these variables, the answers may represent an individuals' recognition of his own limitations. For example, those who like to help others may not have the aggressiveness to be a successful manager. But then the variable represents skills that determine earnings.

The trade offs of earnings with nonpecuniary returns is quite large. Excluding the teacher dummy which is discussed below, but including all the other significant coefficients in table 5, we find that the difference in earnings due to various nonpecuniary preferences could be as high as 55% or $5,500 in 1969 and 40% or $2,500 in 1955.[83] Since many of the attributes or tastes involved could be correlated it is not clear that we actually observe the extremes in this sample, but if we do then the effects are greater than all education differences except M.D.

The last nonpecuniary related variable we have used is being a pre college teacher. We find that these people earn 10 and 18% less in 1955 and 1969. The premiumpaid to be a teacher is even larger before the nonpecuniary variables are introduced, which seems reasonable. We can not, however, rule out the possiblity that teachers earn less because they are less able.

Business Assets

The respoddents were asked for their "earnings" without the concept being defined. But we would expect the self employed to report their net income from their business since most people would find it difficult to separate earnings derived from labor from those derived from capital. To try to hold constant the returns from capital, we have included a dummy variable for self employed businessman, another dummy for self employed professional, and most importantly a continous variable on amount of business assets.[84] All of these variables were only measured in 1969. The extra

---

[83] In this calculation we add together the absolute value of all the significant coefficients.

[84] It also includes nonresidential real estate and other nonspecified items. The variable is crude since people were only asked to check one of 8 categories including "don't have" and over $80,000.

measurement error involved in using these variables in 1955 undoubtedly affects the comparability of our answers and our R^2 though comparisons of 1955 and 1969 equations which only use data available in both years indicates that general conclusions on R^2 are not affected. We shall interpret the coefficients on the business asset variable as the rate of return on financial capital invested in business.[85]

In 1969 the coefficient on the business asset variable, which is an estimate of the before tax rate of return, is .12. Such a figure is not unlike the 7 to 10 estimates usually found in studies such as Kravis [26].[86,87] The dummy variable for self employed businessman is still significant though assets and hours worked are included in the 1969 equations, and equals 10% of the standardized base. The self employed professionals, who may not have much in the way of financial investments, receive 31% more than the nonself employed professionals, (though the denominator is too low since for comparability, we have divided by the average earnings of high school graduates).

---

[85] This interpretation, however, may be wrong for several reasons. Consider the results obtained from regressing a person's earnings which equal wage income plus returns from capital(assuming that education, etc. is held constant by sample design). That is, we regress $W + rk = cK$. The expected value of c would be equal to $E\Sigma(w+rK)\ (K)/\Sigma K^2 = r + \Sigma(wK/K^2)$. If wage income and business assets are not correlated (linearly) the coefficient on K will be an unbiased estimate of the returns from capital but if people with more capital also have higher wage rates (education, etc. constant) then c is biased upwards as an estimate of r.

[86] Also the asset variale must be measured with error since people only checked categories into which their assets fell and because the data was taken from an asset breakdown and real estate holdings could be included in the business asset line.

[87] Christenson [11] has argued that because unincorporated businesses do not have to pay the corporate income tax, a 7 to 10% return is consistent with the 15% before tax return made by corporations.

In 1955 the coefficient on 1969 business assets is still highly significant (a "t" of 11)at .03 even though the growth of assets must not have been uniform during the period and some people must have changed their self employment/salaried status. Probably because of the increased measurement error involved in using the 1969 asset and hours variables in 1955, the 1969 self employment businessman dummy is as important in 1955 as in 1969. On the other hand the 1969 self employed professional dummy is not dignificant presumably becasue many of these people were salaried in 1955 and not had a chance to display their true worth to their employers.

Since we have only health related data from 1969, we will not compare the results for various years though the interested reader can consult the equations in the appendix.

Conclusion

The many and varied comparisons made in this section lead to several important conclusions. First the effects of nearly all variables change during a person's life cycle and in general display a profile that increases with age. Second the profiles are steeper for the education variables than most other variables though as shown in more detail below the steepest profile is for those who attended private elementary school. Third, even after holding constant a wide variety of variables, we still find that education leads to large and statistically significant differences in earnings. These differences, however, are relatively small in comparison with those arising from the conglomeration of family background, attitudes and nonpecuniary preferences and are no larger than the differences due

to ability. While we will return to the topic below it is also important to realize that a large portion of the differences in annual earnings are due to unmeasured variables and random events.

V. Inequality: Extent and Causes

In this as in most samples, the distribution of earnings is skewed to the right.[88] Since most people assume that something called "ability" or capacity is normally distributed, much attention has been paid to the question of why earnings exhibit a skewed distribution.[89] Becker and Mincer [35] have demonstrated that such distributions can be generated by "acquired" human capital models. Mandelbrot[31] explains skewness solely in terms of many different inherited skills. Champernowe[10], Aitcheson and Brown[1], and others have shown that stochastic processes that operate continuously can generate skewed distributions.[90] In Friedman's model, skewness arises from behavior towards risk rather than differences in abilities. It is appropriate for us both to test various hypothesis generated by each theory to determine if the theory is correct and to estimate the contribution of each theory or(more realistically) a set of variables to earnings inequality.

Inequality in Earnings

The inequality in earnings can be measured in several ways.[91] One important measure is the Lorenz curve, which indicates the percent of

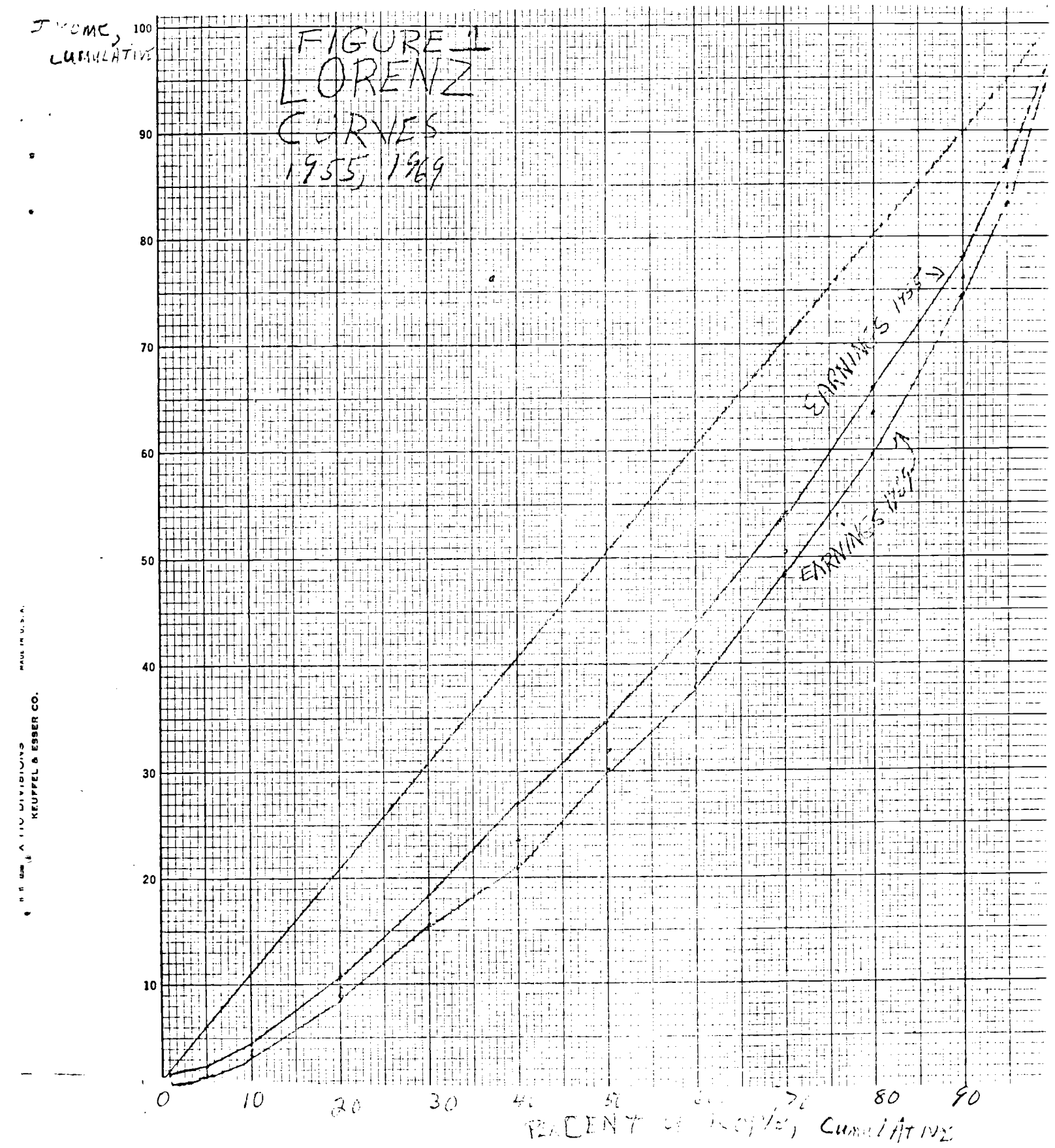
---

[88] See Lydall[30] or Kravis[27] for surveys of other samples. Lebergett suggests that among full time males who are not self employed, the earnings distribution in 1959 approaches normality. For some purposes, however, the self employed and unemployed should be included in the earnings distribution.

[89] There is little direct evidence on the distribution of capacity. I.Q. scores, for example, are generally scored so as to be normally distributed.

[90] For an excellent summary of all these models, see Mincer [35].

[91] See Atkinson [3], Mincer [35], Kravis[27].



total earnings received by the top X%. The Lorenz curves for 1955 and 1969 are presented in figure 1. Also drawn in that figure is a diagonal which is the Lorenz curve that would be observed if each person had the same earnings. In all years studied earnings are not distributed equally and are below the diagonal.

All summary measures of relative inequality of two Lorenz curves will yield the same ranking provided the two curves do not intersect.[92] Conversely, if the curves intersect, there always are some measures that would disagree on whether curve 1 or 2 is more unequal. Since earnings do not follow any well known distribution, we have used the nonparametric Kolmogorov-Smirnov test (KS) to determine if the difference in the Lorenz curves is statistically significant. Results of the KS test indicate that the 1969 curve is statistically different from (more unequal than) the 1955 curve.

We also have examined the Lorenz curves for various education and mental ability groups.[93] In either 1955 or 1969, the Lorenz curves for any two mutually exclusive groups, such as high school and some college, were never significantly different at the 5 percent level though many were at the 10 percent level. For any particular group, the 1969 curve always was beneath the corresponding 1955 curve and the maximum

---

[92] See Atkinson [3].

[93] The education and ability groups are those defined in chapter .

differences which range from 6 to 10 percentage points were always significant at the 5 percent level. Thus there is little difference in inequality in earnings between various education and ability groups in any year but more inequality in each case in 1969 than in 1955.

From Variance to Kurtosis

Thus far we have indicated that earnings inequality has varied from year to year. For many purposes, however, it is necessary to ask how particular features of the distribution have changed over time and to what extent these features and their change are the consequence of the distribution of education, mental ability, etc. A quantifiable and at times decomposable description of a distribution can be obtained from various "moments" of the distribution.[94] The first four moments measure the mean, variance, skewness, and kurtosis of the distribution.

In 1969 our standard deviation, σ, is \$9.4.[95] In some types of labor markets we would expect σ to increase when average earnings did. For these cases a standardized measure is provided by the coefficients of variation, σ/mean, which is about 2/3 in 1969.

Several measures of symmetry have been proposed in the literature. To avoid reranking the observations as we hold constant education and

---

[94] We will assume that the expected values of the first four moments can be estimated from the actual value. This need not be true. For example, if the distribution were Pareto, the expected value of the variance would be infinite though a number could be obtained from the data.

[95] To insure comparability with the regression results, and to save on costs, the 1955 and 1969 statistics are based on the approximately 4600 people who reported earnings in both years.

Table 6

Moments of Earnings and LN Earnings in 1955 and 1969

Year	Mean	Standard Deviation[a]	Skewness[b]	Kurtosis[c]
arnings				
1955(58$)	$7.3	3.8	5.4	62.0
1969(58$)	14.5	9.4	3.0	13.9
Percentage Change55-69	100%	147%	-44%	-78%
N Earnings				
1955(58$)	1.9	.38	.73	2.67
1969(58$)	2.5	.50	.67	.92

$\Sigma(Y_i - \bar{Y})^2/(N - 1)$

$\Sigma(Y_i - \bar{Y})^3/\left[\Sigma(Y_i - Y_i - \bar{Y})^2\right]^{3/2}$ $n^{\frac{1}{2}}$

$\left(\Sigma(Y_i - \bar{Y})^4/\sigma^4\right) n - 3.0$

other sets of variables, we will use the third moment standardized by the second to eliminate scale effects. A distribution is skewed to the right when this measure is positive, as is our 1969 estimate of 3.0. At the 5% level we can reject the null hypothesis that the population is normally distributed which is symmetric, using a test developed by Fisher.

Kurtosis measures the frequency of observations in the tail or near the mean of the distribution. We use the fourth moment divided (standardized) by the second. From this ratio we subtract 3 which is the expected value of the kurtosis in a normal distribution. Larger values such as our 12, indicate that there are too many observations in the tails or too few near the mean as compared with the normal curve.

In 1955 mean earnings are $7,300 (in 1958 prices). The standard deviation is $3.8 and the coefficients of variation is about 1/2. Our skewness and kurtosis estimates are 5.4 and 62.0 respectively, neither of which would be in accord with the null hypothesis that the distribution is normal. Thus in both 1955 and 1969, the distribution of earnings is skewed to the right and has larger numbers of people in the tails.

Given the differences between our sample and the U.S. population, the results on the various inequality measures in any one year have

restricted interest until we control for education, ability, etc. But the changes during the 14 years are of substantial interest - especially since such data are not generally available over such a time span and so late in the life cycle.

Between 1955 and 1969 mean earnings in constant dollars grew by about 100%. Since the standard deviation increased by a greater amount than the mean, the coefficients of variation increased by 27%.[96] The changes in the skewness and kurtosis measures are both negative. Thus contrary to the usual interpretation of stochastic theories, the distribution is becoming less asymmetric and less deviant from a normal curve as the people age (though the 1969 curve is far from a normal curve).

One skewed distribution that has been used to describe the earnings distribution is the lognormal. The skewness and kurtosis results for the log of earnings in table 1 are not consistent with the null hypothesis that earnings in 1955 or 1969 are distributed log normally.[97]

Sources of Variance, Skewness and Inequality

Our sample is, of course, better educated, mentally more able, probably less risk averse, and more limited in age than the population. Since all

---

[96] Given our earlier results on (nonintersecting) Lorenz curves and Atkinson's theorems, the coefficients of variation and the standard error which are measures of inequality must increase.

[97] Careful analysis of nationwide random samples has generally concluded that the earnings do not follow the log normal distribution for high levels of income, but probably because of the restricted distribution of education, mental ability and age in our sample, the deviations from log normalcy (on a chart not shown) are greater and occur over a wider range of earnings in this sample.

these characteristics affect earnings and have a distribution different than in the population, there is no reason to expect to find that the distribution of earnings is the same as that in the population. Despite this we can still use the sample to study problems of interest. For example, suppose the true equation in the population is

$$1)\ Y_i = X_i a + u_i$$

where X_i is a vector of (measured) independent variables, a the associated vector of coefficients and u_i are errors arising from random events and unmeasured variables. Because our distribution of the X's differs from the population, we have an unequally weighted stratified sample.[98] As long as the u's are distributed the same as in the population, we can study the distribution of $Y - Xa = u$ to determine what the population distribution would be if everyone had the same education, ability, etc.

In examining the sources of various aspects of inequality, several things must be noted. First since the equation's coefficients are selected so as to minimize the variance of the residuals with no attention given to the skewness or kurtosis, the results (on sources) are less reliable for these latter two measures than for the variance.[99]

---

[98] It is well known that such samples yield unbiased estimates of the a's. Thus we can use the equations we have developed to examine the effect of the various X's, on earnings, for the range of each X in the sample.

[99] Since most of our variables are (zero, one) dummies, our coefficients are estimates of the mean in various cells. Provided our model specifications- including interaction and homoskedasticity are correct - the residuals represent the distribution within various cells and can be used to study skewness and kurtosis.

Table 7

Sources of Inequality in 1969 and 1955

	Standard Error	Skewness	Kurtosis
969			
	9.42	3.05	13.90
- Y_1	7.75	2.76	14.75
- Y_2	9.11	3.22	15.27
- Y_3	9.33	3.11	14.31
- Y_4	8.63	2.82	13.39
- Y_5	9.20	3.12	14.61
- Y_6	9.33	3.05	13.91
- Y_7	9.06	3.11	14.78
- Y_8	9.37	3.01	13.71
955			
	3.81	5.35	61.99
- Y_1	3.41	5.56	78.24
- Y_2	3.74	5.47	65.09
- Y_3	3.78	5.41	62.88
- Y_4	3.65	5.40	68.50
- Y_5	3.74	5.46	64.29
- Y_6	3.80	5.32	62.34
- Y_7	3.69	5.42	65.12
- Y_8	3.80	5.33	61.99

he Y_1 through Y_8 series are based on equation in tables .

1 = all variables
2 = education coefficients, including M.D. and L.L.B., and the Gourman rating
3 = mental ability variables
4 = business assets, and the self employed businessmen and professional dummies
5 = prefer to be salaried and the 4 other nonpecuniary variables
6 = age, year of first job, hours worked, hours on second job
7 = time spent, private schools, in law, biography, religion, size of current town, never move variables
8 = teacher, no response in '72, weeks lost from illness, age entered school, religious school attendance and weight variables

Table 8

Average Earnings in Various Tenths in the Earnings Distribution

And Their Percentage Change in 1955 and 1969 (Thous. $)

	Total			High School			Some College			Bachelors			Graduate		
	1955	1969	%Δ55 to 69	1955	1969	% Δ	1955	1969	%Δ	1955	1969	%Δ	1955	1969	%Δ
ttom 10%	$3.5	$7.2	106%	2.8	5.9	111%	3.1	6.4	106%	$3.4	$7.5	121	3.1	7.5	142
< 20%	4.4	9.6	118	4.0	8.3	108	4.4	9.4	114	4.8	11.4	138	4.5	11.5	156
< 30%	4.9	11.0	129	4.6	9.3	102	4.8	10.3	115	5.3	12.8	141	5.0	13.2	164
< 40	5.3	12.4	134	4.8	10.1	110	5.3	11.7	121	5.7	14.6	156	5.4	14.9	176
< 50	5.8	14.1	143	5.2	11.2	115	5.8	13.1	126	6.1	15.9	161	6.0	16.4	173
< 60	6.1	15.5	154	5.5	12.2	122	6.1	14.9	144	6.6	17.9	171	6.4	18.3	186
< 70	6.9	17.8	157	6.0	13.6	127	6.8	16.6	144	7.2	19.9	176	7.1	20.7	192
< 80	7.6	20.7	172	6.5	15.6	140	7.4	19.4	162	8.3	23.0	177	7.7	30.8	300
< 90	8.9	26.6	200	7.6	20.1	164	8.6	25.7	199	9.8	28.7	193	8.8	33.7	283
< 100%	14.2	46.0	224	10.1	35.3	250	14.0	45.8	227	11.2	48.6	334	12.8	49.9	290

Second despite this caveat, the effects of the X's on skewness and kurtosis might be larger than those on variance.[100]

Table 3 contains estimates for 1969 of the standard error, skewness, and kurtosis with the latter two standardized by the standard error raised to the appropriate power.[101] This standardization is appropriate since we are primarily interested in the question of whether the distribution would be normal or would be much less skewed if ability, etc., were the same for everyone. But variables which reduced the residuals will also reduce u^3 or u^4; thus, the resulting series could be as skewed though $\Sigma(Y_i-\bar{Y})^3$ would be smaller.

We present the estimates for earnings (Y) and residual earnings, (Y-X*a) where X*a refers to a subset or all of the variables used in the equation in table A1. If we had estimated an equation with just X* generally we would have obtained different estimates of these coefficients. But since such coefficients would be biased estimates of the true parameters, it was felt that it was better to use the estimates from the comprehensive equation.[102]

---

[100] For example suppose that the variable being considered is a zero one dummy variable, Z. The ones in the Z variable could all be located just so that eliminating the effect of Z would eliminate completely any (nonnormal) kurtosis in the earnings distribution. Similarly the Z variable could be the sole source of skewness in a distribution. Finally since most of our variables have been transformed into dummy variables, the effects of say schooling depend on the distribution of people by education level and their coefficients.

[101] See Kendall and Stuart [24].

[102] However, part of the effects of say education may be appearing in other coefficients whose variables are partially determined by education.

Using the most comprehensive equation available, the standard error of the residual earnings is reduced by about 18% to $7.8 in row 2 of table 3. The remaining rows in the table, identified at the bottom, indicate the effects of various sets of variables. For purposes of reference, Y_2 will be called education, Y_3 mental ability, Y_4 self employment, Y_5 nonpecuniary trade offs, Y_6 work related experiences, Y_7 socioeconomic standing, and Y_8 miscellany. The reduction in the standard errors indicate the partial R^2's -ignoring sign - of these variables but because reductions in variance depend upon the covariance of the independent variable, the effects of the individual rows are not additive.

The self employment data reduces the standard error, σ, by 8% with business assets being the most important single variable. The SES variables reduce σ by 5%. The quantity and quality of education variables (including M.D. and L.L.B .) reduce σ by less than 4% and all other sets of variables have even smaller impacts on σ. The percentage reductions in σ are, incidentally, the partial $\hat{R}^2$'s for each set of variables.[103]

In the sample, the standardized skewness measure is 3.05. As shown in the $Y - Y_i$ row, the full set of variables reduces the skewness by 10% to 2.76.[104] Thus even if education, ability, SES, business assets, etc. were equal for all individuals, the earnings distribution would be about 90% as skewed as originally once we adjust for the reduction in

---

[103] All the moments in table 3 are calculated about the mean that applies to each row.

[104] The reduction in $\Sigma(u_i^3)$ is about 50%.

variance from holding each of these items constant.

Interestingly when education, ability, the nonpecuniary trade offs, are individually held constant, the standardized skewness measure increases between 1 and 5%. On the other hand, the self employment variables reduce the relative skewness by 7% and the miscellaneous variables in Y_8 reduce skewness 1%.

Thus we can conclude that if everyone in the sample had the same education or ability or nonpecuniary preferences, the earnings distribution would have slightly more skewness.[105] We can also conclude that difference in self employment (size of business assets and being self employed) have contributed greatly to the existing skewness in the distribution in this sample.

Now let us examine kurtosis. In the sample the standardized kurtosis measure had a value of 13.9 which is far from and significantly differen from the zero expected in the normal distribution.[106,107] The standardized kurtosis measure based on the residuals from equation 2, is increased by 6%. Looking at the other rows, we find that only holding constant self employment and the miscellany in Y_8 has lead to a reduction in relative kurtosis. Even with self employment held constant the distribution

---

[105] This increase is partly due to the distribution of people in each category, e.g., nearly rectangular over the education groups and in the ability and SES instances, and partly to the pattern of the coefficients.

[106] We have already subtracted 3 which is the value if the distribution is normal.

[107] The unstandardized measure of kurtosis, Σu_i^4, would decline substantially, but even with the initial variance, the distribution would not be normal.

Table 9

Sources of Inequality in 1969 and 1955

	Standard Error	Skewness	Kurtosis
1969			
Y	9.42	3.05	13.90
$Y - Y_1$	7.75	2.76	14.75
$Y - Y_2$	9.11	3.22	15.27
$Y - Y_3$	9.33	3.11	14.31
$Y - Y_4$	8.63	2.82	13.39
$Y - Y_5$	9.20	3.12	14.61
$Y - Y_6$	9.33	3.05	13.91
$Y - Y_7$	9.06	3.11	14.78
$Y - Y_8$	9.37	3.01	13.71
1955			
Y	3.81	5.35	61.99
$Y - Y_1$	3.41	5.56	78.24
$Y - Y_2$	3.74	5.47	65.09
$Y - Y_3$	3.78	5.41	62.88
$Y - Y_4$	3.65	5.40	68.50
$Y - Y_5$	3.74	5.46	64.29
$Y - Y_6$	3.80	5.32	62.34
$Y - Y_7$	3.69	5.42	65.12
$Y - Y_8$	3.80	5.33	61.99

The Y_1 through Y_8 series are based on equation in tables .

Y_1 = all variables

Y_2 = education coefficients, including M.D. and L.L.B., and the Gourman rating

Y_3 = mental ability variables

Y_4 = business assets, and the self employed businessmen and professional dummies

Y_5 = prefer to be salaried and the 4 other nonpecuniary variables

Y_6 = age, year of first job, hours worked, hours on second job

Y_7 = time spent, private schools, in law, biography, religion, size of current town, never move variables

Y_8 = teacher, no response in '72, weeks lost from illness, age entered school, religious school attendance and weight variables

Table 10

Average Earnings in Various Tenths in the Earnings Distribution

And Their Percentage Change in 1955 and 1969 (Thous. $)

	Total			High School			Some College			Bachelors			Graduate		
	1955	1969	%Δ55 to 69	1955	1969	% Δ	1955	1969	%Δ	1955	1969	%Δ	1955	1969	%Δ
ottom 10%	$3.5	$7.2	106%	2.8	5.9	111%	3.1	6.4	106%	$3.4	$7.5	121	3.1	7.5	142
.0 ≤ 20%	4.4	9.6	118	4.0	8.3	108	4.4	9.4	114	4.8	11.4	138	4.5	11.5	156
0 ≤ 30%	4.9	11.0	129	4.6	9.3	102	4.8	10.3	115	5.3	12.8	141	5.0	13.2	164
0 ≤ 40	5.3	12.4	134	4.8	10.1	110	5.3	11.7	121	5.7	14.6	156	5.4	14.9	176
0 ≤ 50	5.8	14.1	143	5.2	11.2	115	5.8	13.1	126	6.1	15.9	161	6.0	16.4	173
0 ≤ 60	6.1	15.5	154	5.5	12.2	122	6.1	14.9	144	6.6	17.9	171	6.4	18.3	186
0 ≤ 70	6.9	17.8	157	6.0	13.6	127	6.8	16.6	144	7.2	19.9	176	7.1	20.7	192
0 ≤ 80	7.6	20.7	172	6.5	15.6	140	7.4	19.4	162	8.3	23.0	177	7.7	30.8	300
0 ≤ 90	8.9	26.6	200	7.6	20.1	164	8.6	25.7	199	9.8	28.7	193	8.8	33.7	283
0 ≤ 100%	14.2	46.0	224	10.1	35.3	250	14.0	45.8	227	11.2	48.6	334	12.8	49.9	290

Table 11

Effects of Various Sets of Variables on Inequality
By Five Ability Levels

Ability Fifth	1955 Standard Error	1955 Skewness	1955 Kurtosis	1969 Standard Error	1969 Skewness	1969 Kurtosis
Bottom 1/5						
Y	2.91	2.92	14.79	7.81	3.39	17.89
$Y - Y_1$	2.67	1.90	9.54	6.71	2.98	20.23
$Y - Y_2$	2.88	2.89	14.96	7.60	3.55	19.83
$Y - Y_4$	2.83	2.45	12.36	7.24	3.29	20.36
$Y - Y_5$	2.85	2.94	15.27	7.61	3.45	18.49
$Y - Y_6$	2.91	2.81	13.84	7.76	3.40	17.96
$Y - Y_7$	2.83	2.64	12.60	7.68	3.25	17.48
$Y - Y_8$	2.91	2.86	14.67	7.75	3.26	17.02
2nd 1/5						
Y	3.90	5.39	49.39	9.14	3.50	17.95
$Y - Y_1$	3.53	5.41	56.95	7.52	2.98	17.57
$Y - Y_2$	3.86	5.41	50.26	8.89	3.55	18.28
$Y - Y_4$	3.78	5.37	52.09	8.38	3.16	17.11
$Y - Y_5$	3.83	5.47	50.96	8.89	3.55	18.66
$Y - Y_6$	3.88	5.44	50.47	9.07	3.47	17.83
$Y - Y_7$	3.76	5.31	49.88	8.86	3.56	19.15
$Y - Y_8$	3.89	5.36	49.29	9.04	3.44	17.61
3rd 1/5						
Y	3.32	3.02	13.73	9.06	3.36	16.44
$Y - Y_1$	2.86	2.20	9.98	7.52	2.95	16.64
$Y - Y_2$	3.22	2.89	13.11	8.81	3.50	17.87
$Y - Y_4$	3.07	2.67	11.89	8.16	3.05	15.37
$Y - Y_5$	3.25	3.07	14.28	8.84	3.44	17.32
$Y - Y_6$	3.32	2.94	13.32	8.97	3.37	16.65
$Y - Y_7$	3.27	2.99	13.93	8.79	3.44	17.48
$Y - Y_8$	3.30	2.98	13.46	9.05	3.31	16.16
4th 1/5						
Y	3.82	3.80	23.84	9.66	2.77	11.42
$Y - Y_1$	3.40	3.66	25.99	7.76	2.66	13.56
$Y - Y_2$	3.75	3.89	25.00	9.39	2.95	12.73
$Y - Y_4$	3.63	3.65	23.43	8.75	2.66	11.86
$Y - Y_5$	3.74	3.87	24.71	9.42	2.81	11.93
$Y - Y_6$	3.81	3.76	23.74	9.53	2.77	11.61
$Y - Y_7$	3.70	3.87	25.24	9.19	2.84	12.18
$Y - Y_8$	3.83	3.78	23.83	9.59	2.71	11.12
5th 1/5						
Y	4.50	7.27	95.12	10.26	2.77	11.29
$Y - Y_1$	4.17	7.77	114.43	8.81	2.45	10.41
$Y - Y_2$	4.47	7.33	96.74	10.00	2.89	12.16
$Y - Y_4$	4.36	7.51	104.38	9.55	2.49	9.69
$Y - Y_5$	4.45	7.33	96.34	10.12	2.83	11.85
$Y - Y_6$	4.48	7.31	96.70	10.15	2.75	11.15
$Y - Y_7$	4.39	7.41	99.69	9.85	2.82	11.93
$Y - Y_8$	4.49	7.26	95.45	10.21	2.78	11.46

See table 2 for definitions. $Y-Y_3$ omitted since Y_3 only contains the ability variables.

Table 12

1955 and 1969 Earnings Distribution by Ability Level

	Earnings					
	1955			1969		
	Standard Deviation	Skewness	Kurtosis	Standard Deviation	Skewness	Kurtosis
ttom 1/5	2.91	2.92	14.79	7.81	3.39	17.89
d 1/5	3.90	5.39	49.39	9.14	3.50	17.95
d 1/5	3.32	3.02	13.73	9.06	3.36	16.44
n 1/5	3.82	3.80	23.84	9.66	2.77	11.42
p 1/5	4.50	7.27	95.12	10.26	2.77	11.29
	LN Earnings					
ttom 1/5	.36	.73	1.60	.47	.84	1.36
d 1/5	.38	.86	3.58	.49	.87	1.20
d 1/5	.37	.68	2.30	.47	.89	1.56
n 1/5	.39	.63	2.67	.50	.59	.61
p 1/5	.38	.82	3.61	.49	.40	1.12

Table 13

Effects of Various Sets of Variables on Inequality

by Four Levels of Education, in 1955 and 1969

	1955			1969		
	Standard Error	Skewness	Kurtosis	Standard Error	Skewness	Kurtosis
igh School						
	2.81	2.87	13.68	7.12	3.59	21.36
$- Y$	2.50	1.97	9.79	5.74	2.68	17.50
$- Y_1$	2.82	2.84	13.50	7.12	3.61	21.50
$- Y_2$	2.80	2.89	13.97	7.07	3.61	21.62
$- Y_3$	2.64	2.34	10.74	6.28	3.18	19.41
$- Y_4$	2.73	2.79	13.26	6.84	3.56	21.64
$- Y_5$	2.80	2.79	13.10	7.07	3.60	21.68
$- Y_6$	2.75	2.82	14.04	6.84	3.47	20.39
$- Y_8$	2.82	2.80	13.48	7.13	3.52	21.37
ome College						
	4.30	5.37	51.00	9.79	3.29	15.20
$- Y_1$	3.87	5.25	53.81	8.32	2.87	15.45
$- Y_2$	4.29	5.30	51.17	9.72	3.30	15.32
$- Y_3$	4.30	5.38	50.98	9.75	3.29	15.30
$- Y_4$	4.14	5.33	52.67	9.02	3.09	15.58
$- Y_5$	4.25	5.45	52.48	9.58	3.36	15.96
$- Y_6$	4.29	5.39	51.45	9.72	3.28	15.12
$- Y_8$	4.13	5.30	51.18	9.37	3.23	15.36
	4.30	5.30	50.21	9.76	3.23	14.84
Bachelors Degree						
Y	4.25	6.30	77.92	9.64	2.81	11.50
$Y - Y_1$	3.93	6.94	99.70	8.38	2.57	11.35
$Y - Y_2$	4.23	6.36	79.06	9.58	2.85	11.80
$Y - Y_3$	4.22	6.34	78.52	9.60	2.85	11.76
$Y - Y_4$	4.13	6.41	85.69	9.02	2.48	9.69
$Y - Y_5$	4.19	6.40	79.79	9.50	2.85	11.85
$Y - Y_6$	4.22	6.40	80.63	9.50	2.84	12.76
$Y - Y_7$	4.15	6.53	83.65	9.35	2.90	12.60
$Y - Y_8$	4.26	6.32	78.25	9.58	2.78	11.28
Graduate Work						
Y	3.33	2.53	10.29	10.02	2.96	12.73
$Y - Y_1$	2.89	1.56	8.08	8.19	2.65	13.63
$Y - Y_2$	3.12	2.21	9.35	9.55	3.16	14.54
$Y - Y_3$	3.29	2.60	10.84	9.93	3.00	13.02
$Y - Y_4$	3.14	2.33	9.55	9.08	2.79	12.74
$Y - Y_5$	3.27	2.62	11.03	9.79	3.05	13.53
$Y - Y_6$	3.32	2.53	10.30	9.85	2.97	12.85
$Y - Y_7$	3.32	2.50	10.77	9.80	3.01	13.49
$Y - Y_8$	3.27	2.47	10.01	9.83	2.97	13.04

1. finitions see table 3 of this chapter.

row should rep at the row for Y. The small recorded change occurs because a few people

treat as not having attended college went for less than a semester and have a Gorman ra

of earnings would exhibit kurtosis. On the other hand, the elimination of education differences leads to a big increase in kurtosis. This suggests that education pushes more poeple away from the mean and makes for a smoother transition to the tails whose existence is not related to education.

1955

Our analysis of the source of inequality in 1955 earnings distribution is handicapped by the fact that several of our most important variables - including the self employment ones - are measured only in 1969 and must have changed between 1955 and 1969. Nevertheless, let us examine the same statistics on inequality. As shown in table 3, the standard error of earnings in 1955 is $3.8 (thousands of 1958 dollars). Since the 1955 equation has a smaller R^2 the standard error of $Y - Y_1$ has only been reduced by 10%. The standard error of earnings is reduced by about 1 1/2 to 3% by each of education, ability, risk preference and nonpecuniary variables, work experience, SES, and the miscellany in Y_8 but the self employment variables reduce the standard deviation by 4%.

The 1955 skewness measure is 5.3 which is much greater than in 1969. Examining the various rows, we find that holding constant any subset (except work experience and the miscellany) of the whole set of the characteristics in equation 2 increases relative skewness.[108]

[108] The major difference between the 1969 and 1955 results for the self employment variables may well be due to the measurement problem, i.e., some in the 1955 right hand tail in 1955 are no longer self employed in 1969 while some with large business holdings in 1969 were not yet self employed.

Table 14

1955 and 1969 Earnings Distributions (in 1958 dollars)
by Education Level

	Earnings					
	1955			1969		
	σ	skewness	kurtosis	σ	skewness	kurtosis
High School	2.81	2.87	13.68	7.12	3.59	21.36
Some College	4.30	5.37	51.00	9.79	3.29	15.20
Bachelors Degree	4.25	6.30	77.92	9.64	2.81	11.50
At Least Some Grad.	3.33	2.53	10.29	10.02	2.96	12.73
	LN Earnings					
High School	.36	.52	1.84	.46	.92	1.73
Some College	.40	.84	3.07	.51	.91	1.11
Bachelor's Degree	.38	.92	3.59	.47	.64	1.02
At Least Some Grad.	.37	.48	1.52	.48	.54	1.31

Much the same pattern appears on kurtosis. The residuals from the full or any partial set of variables (except the miscellany) have greater standardized kurtosis than in the original earnings data and this kurtosis is greater in 1955 than in 1969.

Pattern by Education Level

Since we have eliminated the average difference in earnings for people with different amounts of education, ability, etc., the above analysis essentially analyzes the between cell contribution of education, ability, etc. to inequality. For several purposes it is important to study inequality within various education and ability cells. As shown in table 4, in 1955 the standard error is lowest for those with just a high school education, at the peak for those who started or completed college, and intermediate for those with more formal education than a bachelor's degree.[109] The relative skewness and kurtosis measure increases sharply from high school through a bachelors degree and then falls to their lowest level for those with at least some graduate work. In each education group neither earnings nor the log of earnings are distributed normally.

In 1969 it is still true that the earnings distribution is neither normal nor lognormal. In other respects, the pattern is much different than in 1955. While high school graduates still have the lowest standard error, graduate students (including M.D.'s and L.L.B.'s) have the highest. The skewness and kurtosis measures are greatest for high school graduates

---

[109] There are from 950 to 1330 people in each cell.

and then decrease through the bachelors level followed by a slight increase at the graduate level. The major change in the high school category between 1955 and 1969 requires comment. We suggest that the above average growth in the standard error and the large absolute and comparative increases in the skewness and kurtosis measures occur because even the talented or lucky individual among high school graduates find that it takes longer to get to the top.[110] Thus in 1955 these people would not be so far out in the right hand tail as they are in 1969. Perhaps because of a different distribution of talent among the more educated, because of credentialism based on education or because of nepotism, this same phenomenon does not occur in other education classes.

More light can be shed on these and other issues by examining the distribution of the residuals in each education class. Since we are not able to find significant differences in the coefficients by ability or education level we can use the same sets of coefficients as previously in making these calculations.[111]

Consider first the 1955 results in table 5. At each education level the standard error declines by about 10%, with the self employment variables $(Y - Y_4)$ generally responsible for the largest reduction in the standard error and the SES $(Y - Y_7)$ and nonpecuniary trade offs $(Y-Y_5)$ variables nearly as important.

---

[110] The private education variables, which we think are a proxy for nepotism, have bigger range effects and partial R^2's in 1969 than in 1955.

[111] That the coefficients do not differ significantly, of course, tells us nothing about the pattern of inequality in the residuals as education varies.

In all but the bachelors group, holding the self employment variable constant causes a reduction in the relative skewness measure. The opposite is true in table 4 for the total sample. It seems likely that this difference is due to the use of a separate standardization factor in each education level or in other words the total sample combines within education distributions which have different parameters. In the high school and graduate level, kurtosis decreases when self employment is held constant while the opposite is true at the other two education levels. No other set of characteristics has a large impact on skewness or kurtosis in 1955 at more than one education level.

In 1969 the picture is more varied. The standard error of $Y - Y_1$ is nearly identical for all but the high school category which remains the lowest and much of the difference in skewness and to a lesser extent kurtosis disappears. At each education level holding constant the self employment variable substantially reduces the standard error and the relative skewness but only the high school and bachelors degree estimates of relative kurtosis. Once again SES and nonpecuniary variables play an important secondary role in determining the standard error but have little effect on skewness and kurtosis.

Mental Ability

Since very little information has ever been presented about the distribution of earnings by mental ability, it is appropriate to repeat the above analysis by the 5 ability levels. Table 6 contains the distribution

statistics for earnings and the log earnings for each ability fifth.[112] In 1955 the standard error is lowest for the bottom fifth and highest for the top. The middle fifth, however, has a lower standard error and coefficient of variation than the group on either side. Since the standard error of the log of earnings does not vary with ability, the above results may be due to a few extreme observations - as is also suggested by the skewness and kurtosis measure. Both skewness and kurtosis follow the same pattern, with highest values in the top 1/5th; however, none of the earnings distributions within an ability cell are normal or log normal.

In 1969 the standard deviation follows the same pattern as in 1955 (though the largest fifth has the lowest coefficient of variation). Skewness and kurtosis are substantially lower in the top 2 fifths than in the lowest 3; however, none of the distributions are normal or lognormal.

Table 7 presents the inequality pattern by ability level once other variables have been held constant. As we have consistently found in 1955, the self employment variables cause the biggest reduction in the standard error in most ability fifths with the SES and nonpecuniary trade offs contributions almost as large. In 1969 holding self employment constant substantially reduces the standard error and skewness.

At first glance the inequality pattern seems confusing. For example when comparing the education results, we find high school to be (about)

---

[112] It is important to remember that the ability measures is more mathematical than a standard I.Q. measure and that to be in the sample a person had to score in the top half of the Air Cadet Qualifying Test. The 1/5ths, therefore, are more like tenths for the U.S. population.

the lowest on skewness and kurtosis in 1955 but the highest in 1969.[113] A similar reversal occurs in the ability results.

A sorting uncertainty model can be used to explain these reversals and other results contained in tables 4 and 6. As explained earlier the basis of this model is that it is difficult to measure in advance a person's capacity to perform in various jobs. Firms also do not use piece pay rate perhaps because of difficulty in measuring one person's productivity and of interdependencies within production lines or heirarchial structures. Firms, therefore, initially assign people to particular jobs on the basis of certain "objective" criteria such as education, marital status, military record, etc. and certain "subjective" criteria such as performance on an interview.[114] In addition appointment may be based on discrimination as evidenced by race, gender, or "parental pull".

Since firms know that the above criteria or signals are fallable, they continually monitor performance on the job to base decisions on fire, retain, and promote. Average initial earnings may be fairly uniform when studied by objective criteria, because of morale problems associated with different pay for the same position and because at low level jobs a person has little chance to use initiative or display productivity outside of a narrow range.[115] People with more potential capacity perform better are promoted faster and have a higher growth rate in earnings, However,

---

[113] Since the adjustments for the other variables never change the rank order on any inequality measure, we will base our statements on the inequality in Y.

[114] The criteria used may vary depending on supply of the "best" groups relative to total demand.

[115] There still can be a wide variance within say education groups because initial position obtained may depend on nepotism, being at the right place at the right time, or because of the importance of subjective criteria.

promotions occur somewhat randomly because the particular vacancies a person is qualified for occur irregularly because a person's talent may not be recognized at once if he "blooms" late, and because family connections or "nepotism" results in faster promotions for equally qualified persons.[116]

Now how does this model, with some other considerations, explain the previous findings. First high school graduates have less objective credentials and probably less parental pull then the more educated, and start at lower rungs in the career ladder. By 1955 the high school graduates have made some progress but they have not yet made it to those positions such as manager or successful business owner at which salaries are very high.[117] Thus in 1955 high school graduates have a smaller standard error, skewness, and kurtosis than those with some college and a bachelors degree, because some in the latter two groups have received promotions to very responsible positions.[118] By 1969, when the men are about 47 years old, firms have sorted out people by capacity thus the talented high school graduate has received his promotions and is at or near his potential capacity at age 47. But the distribution of talent in the high school group is different than in the other groups with relatively few such talented people among the less educated. This

---

[116] Wise [51] has examined the effects of such a system on the variance of earnings using a Markov model.

[117] Pay does not increase linearly with position. See Lydall [30]. For some specific evidence on corporate executives see Taubman-Wales [46], app., chpt.

[118] The graduate level results are of less interest here since M.D., lawyers, and teachers who have monopoly returns and nonpecuniary rewards are mixed in.

difference arises for several reasons. For example the more talented partly inherit their capacity from successful parents who encourage them to get more education.[119] Second some sources of their capacity, (such as drive and creativity), may lead to academic leanings and scholarhips. Third for most people education may be a necessary ingredient in the formation of capacity.

Now, how do we explain the ability results? A plausible argument can be made that the mental ability measure we use is correlated with types of cognitive and to a lesser extent noncognitive skills. Following the lines of the above argument, we would expect skewness and kurtosis for the less able to be relatively low in 1955 and high in 1969. Comparing the bottom and top fifths, we find this to be the case. However, table 8 also indicates very large valuesof skewness and kurtosis in the 2nd fifth in 1955 and an extremely large increase for the top fifth. This is notthe only time we will find something unusual about these two ability fifths. In [46] in chapter we point out the average amount of income from capital is greatest in these two groups. This suggests that through inheritance (financial control ,or nepotism), men in this group were able to reach high positions quickly.

While we can construct a plausible explanation of the changes in inequality measure on the basisof a sorting uncertainty model, other theories are also consistent with the results. For example Mincer[35]

---

[119] See chapter . Also, in this sample educational attainment is related to date of marriage, but a person with wealthier families may have been able to affordboth marriage and education.

has shown that in his theory

$$\frac{\sigma^2(YP)}{\sigma^2(Yj)} - 1 = \frac{r^2\sigma^2(C_T)}{\sigma^2(E_S)} + \frac{2r\rho\sigma(C_T)}{\sigma(E_S)}$$

Where $\sigma^2(YP)$ is the variance in peak earnings

$\sigma^2(Yj)$ is the variance in earnings in the overtaking year

r is the rate of return on post school investment

$\sigma^2(C_T)$ is the variance in the sum of post school investment

$\sigma^2(E_S)$ is the variance in initial post school earnings capacity

ρ is the correlation between dollar investments in schooling and post school investment

We will discuss the issue in more detail in chapter but it is approximately true that 1955 corresponds to the overtaking year,(in any event $\sigma^2(Yt)$ will increase with t if ρ is positive). Thus Mincer's interpretation of the faster growth in σ between 1955 and 1969 for high school graduates is that either ρ or $\sigma(C_T)/\sigma(E_S)$ is greater for these people.[120]

Skewness in Mincer's model arises primarily from the correlations between the means and variances of earnings (within education cells) However, under the same assumptions as above we can express the nonstandardized skewness as

$$\frac{\sigma^3(YT)}{\sigma^3(Yj)} - 1 = 3\rho_1 r \frac{\sigma_{CT}}{\sigma_{E_S}} + 3\rho_2 r^2 \frac{\sigma^2 C_T}{\sigma^2 E_S} + \frac{r^3\sigma^3(CT)}{\sigma^3 E_S}$$

[120] The faster growth rate for high school graduates is evident in the adjusted and unadjusted estimates of σ.

where ρ_1 and ρ_2 are the correlations between E^2_S and C_T and E_S and C^2_T respectively. Generally speaking ρ_1 and ρ_2 will have the same sign as ρ; hence, σ^3_{YP} would certainly exceed σ^3_{Yj} if $\sigma^3(C_T)$ and σ^3_{ES} are the same sign. The theory would also suggest that the faster the growth in variance within education levels, the faster the growth in skewness provided the last term is about the same at all education levels. This is borne out in our sample.[121] The findings are not inconsistent with Mincer's model and indeed can not be made so since σ^3_{CT} can vary by education level.

[121] It is too tedious to analyze the growth in the standardized measure of skewness in Mincer's model since $\sigma^3_{(YP)}/\sigma^2)^{3/2}$ will have to be squared to eliminate the square root in the denominator.

VI. Individual Stability in the Earnings Distribution

While many of our findings are based on variables not previously used in studies of earnings, in principle the same phenomena could be examined for different cohorts in Census type samples. The longitudinal data in our sample also permit us to extend our understanding of the dynamic evolution of the earnings distribution and to analyze the relationship of annual to lifetime earnings by examining the stability of an individual's position in the earnings distribution over time.

The empirical facts on stability and change over a long time span are very valuable in themselves since the distribution of lifetime earnings is more important for many purposes than that of any one years earnings. But equally important these facts allow us to test and thus to have a chance to reject certain earnings' distribution theories, as described below.

Individual Stability and Change in the Earnings Distribution

To examine individual stability in the distribution, we have calculated the "transition probability matrix" for the people who reported earnings in both 1955 and 1969. Table 1 indicates the percentage of people who ended up in any tenth of the 1969 earnings distribution from any given tenth in the 1955 distribution.[122] For example, of the people with the

---

[122] There are not exactly 10% of the sample in each row or column for two reasons. First the dividing points were found for all respondents with nonzero earnings in the sample while some individuals were not included in this table, primarily because they did not report earnings in both years. Secondly, in a few instances, a large number of people reported earnings equal to the dividing point. While we could randomly allocate people to each adjoining class to fill it, it was simpler and not misleading to place people in only one class.

Table 15

Distribution of Earnings in 1969 for 1955 Earnings Percentile - Percent of People

ntile in 1955	Number in 1955	Percentile in 1969 (% of Row Sum)										Average Percentile in 1969
		Bottom 10%	10<20	20<30	30<40	40<50	50<60	60<70	70<80	80<90	90<100	
n 10%	412	38.7%	19.1	10.6	6.5	5.6	6.5	3.9	2.7	3.4	2.6	25.7
10<20	484	15.2	21.7	16.5	11.4	10.8	8.9	4.1	2.3	2.0	1.6	29.2
20<30	368	16.4	20.4	14.4	10.6	10.0	9.3	7.1	4.8	4.5	1.9	34.6
30<40	358	8.9	12.6	16.2	18.1	15.6	11.1	6.7	6.4	2.5	1.7	38.7
40<50	516	5.4	13.0	13.2	14.8	16.5	15.2	9.9	7.8	3.1	1.4	42.8
50<60	586	4.9	10.0	7.3	13.9	14.6	13.9	11.9	11.1	7.5	4.2	46.9
60<70	353	3.1	7.1	3.7	6.8	14.8	16.7	15.3	17.3	11.8	3.3	57.0
70<80	565	3.0	2.5	3.5	6.1	11.1	14.0	17.2	17.7	16.1	8.9	62.8
80<90	500	1.2	3.2	2.8	4.0	3.8	11.2	9.8	19.0	26.0	19.0	71.3
op 10%	462	1.7	1.5	0.8	1.3	3.9	6.9	4.5	10.0	25.5	43.7	80.1
1969	4607	451	492	397	428	491	520	428	470	501	416	

The Cutoff Points by Tenths for 1955 are: 4068, 4788, 5028, 5388,6000,6468,7188,8028,8798.

The Cutoff Points by Tenths for 1969 are: 8899, 10,000, 12,000, 15,000, 16,510, 19,000 , 23,000, 30,000.

Table 16

Distribution of growth rate in earnings 1955 to 1969 by earnings percentile in 1955

Whole Sample [a]

(Y69-Y55)/Y55 = growth rate

tile	<0	0 <.25	.25< .50	.50 <.75	.75< 1.00	1.00< 1.25	1.25< 1.50	1.50< 1.75	1.75< 2.00	2.00< 2.25	2.25< 2.50	2.50< 2.75	2.75< 3.00	3.00 5.00	>5.00	mean growth rate	mean com'd annual growth rate
	0.000	0.007	0.010	.046	.077	.116	.082	100	107	070	075	043	036	135	092	267.5%	6.8%
	0.002	.010	.006	.056	.126	.152	.157	118	101	076	037	050	023	064	021	175.9%	5.1%
	0.000	.005	.035	.070	.138	.177	.087	130	065	082	030	026	041	081	030	180.6%	4.6%
	0.000	.000	.039	.064	.128	.131	.193	103	123	050	039	031	036	042	017	167.1%	4.8%
	0.002	.006	.043	.094	.090	.173	.093	125	075	063	053	025	020	057	019	155.0%	4.6%
	0.000	.000	.026	.099	.141	.178	.152	105	089	068	037	031	010	037	026	171.5%	4.5%
	0.006	.020	.059	.057	.105	.150	.142	096	105	102	023	031	031	059	018	161.0%	4.6%
	0.004	.030	.044	.087	.119	.143	.103	127	087	051	053	021	028	071	032	170.2%	4.5%
	0.010	.048	.062	.068	.118	.114	.098	092	082	062	032	052	024	106	030	176.0%	4.7%
	0.036	.043	.110	.087	.089	.087	.089	100	065	041	039	030	024	089	022	142.5%	3.6%
	.011	.018	.045	.076	.110	.145	.115	.113	.089	.066	.044	.034	.027	.076	.030	175.7%	4.7%

lowest 10% of the earnings in 1955, in 1969 39% were still at the bottom, an additional 30% could be found between the 10 and 30% percentiles, and less than 9 percent have moved up into the top 30 percent of the distribution. As a simple (ordinal) measure of stability we can use the average percentile position, which has risen from 5 to 26% by 1969.

For contrast consider the people in the top 10% in 1955. In 1969 44% were still in the top 10%, an additional 35% were in the next, 20% of the distribution, and only 4% had fallen below the 30th percentile. The average percentile position had fallen from 95 to 80% in 1969.

In the other 10ths in 1955, people tend to be close to their starting position with, for example, from 39 to 64% of the people falling within the same or neighboring tenths of the distribution. Not more than 30% of the people in the row lie above the 70th percentile in 1969 until we reach the 60-70% interval in 1955 while at least 30% of the row fall below the 30th percentile in 1969 until we reach the 50-60% interval in 1955. The average percentile standing in 1969 for each tenth in 1955 rises continuously but on average people who were in the bottom 40% in 1955 have a higher percentile standing in 1969 while the reverse is true for those in the top 60% in 1955.[123,124]

As shown in table 2, between 1955 and 1969 about 1% of the people suffered a decline in nominal earnings, and 15% had a growth of less than 75%.[125] For almost 50% of the sample, earnings grew between 75 and 175%

---

[123] Some of this difference may reflect attenuation since those in the bottom tenth can not fall but can rise in 1969, etc.

[124] In all but one comparison, the KS test would reject the hypothesis that each row is distributed the same as its adjacent rows.

[125] In this section we use nominal earnings rather than the constant dollar ones used in the earlier chapters. This change is made because the determination of the cut off points was done, early on, in current dollars. Deflation would not change the pattern or conclusions.

while for 3% earnings grew in excess of 500%. Using individual observations, the average percentage change is 175% and the average annual compound growth rate between 1955 and 1969 as 4.7% which over 14 years is equivalent to an increase of about 90%. (There is no reason to prefer one measure to the other).

Of the people who were in the second tenth of earnings in 1955: 1% had a decrease in (nominal) earnings; nearly 16%(the mode) had a gain between 125 and 150%; while 8.5% had a growth in excess of 300%. The average growth rate in earnings in this tenth is 176%.

Of the people in the 80th to 90th percentile in 1955: nearly 5% had a decrease in their nominal earnings; the mode is in the 75 to 100% interval; and 14.5% had a growth rate in excess of 300%. The mean growth rate in the next to bottom, and next to top rows are identical, but there are more people in both tails of the distribution in the 80th to 90th percentile, and the two distributions are significantly different at the 5% level (K.S. test).

In all but the two extreme rows, the mean growth in earnings only ranges from 151 to 176% and the compound rates .045 to .051. However, those whose earnings placed them in the top 70 to 90% in 1955 have distributions which are significantly different (K.S. test, 5% level) with more people in both tails than those in the bottom 10-50%. In the bottom tenth the mean change is 267% with a heavy concentration in the right hand tail. In the top tenth, the mean change is only 143% and there is a heavy concentration in the left hand tail.

Distribution of Growth Rates by Education Level

Tables 3-6 contain the growth rate distributions for each of 4 education levels.[126] Since in these tables cutoff points for the tenths are those for the entire sample, we may compare the corresponding rows. In the 10 to 20th percentile, about 68,57,45, and 36% of people with high school, some college, a bachelors degree, and at least some graduate training had earnings increases no greater than 150%. The average growth in earnings increases with education for people with the same earnings in 1955. Despite the relatively small sample sizes within each of these 1955 percentiles, the KS test rejects the hypothesis that the cumulative distribution of, say, the second and ninth rows are the same in each education level.

For any one educational level, the results are similar to those given for the whole sample in table 2. That is except for the top and bottom row, the mean percentage change is independent of earnings percentile in 1955.[127] The people at the bottom in 1955 have the highest growth rate while those at the top in 1955 have the lowest growth rate (except for the high school category). Within each education level those with high earnings in 1955 tend to have distributions with a greater percentage of people in both tails than people with low incomes. Despitethe relatively

---

[126] We used education as reported in 1969. The distribution of education in 1955 is different because of the post 1955 education received by about 8% of the sample.

[127] There is however, a tendency in each of the tables for the average compound growth rate to decrease with 1955 earnings partly because of the wider variance in growth rates at the higher 1955 percentiles.

Table 3 17

Growth Rate in Earnings 1955 to 1969 by Earnings Percentile in 1955

High School Graduates

(Y69 - Y55)/Y55 = growth rate

ile	<0	0 <.25	.25< .50	.50 <.75	.75< 1.00	1.00< 1.25	1.25< 1.50	1.50< 1.75	1.75< 2.00	2.00< 2.25	2.25< 2.50	2.50< 2.75	2.75< 3.00	3.00 5.00	>5.00	mean growth rate	mean com'd annual growth rate
	0.000	.006	.012	.093	.086	154	105	117	130	043	062	049	025	067	049	187.5	5.6%
	0.000	.012	.012	.093	.216	234	191	100	068	031	006	012	019	006	000	124.6	3.7%
	0.000	.000	.091	.091	.190	223	074	140	033	033	017	000	025	066	017	155.9	3.7%
	0.000	.000	.086	.140	.194	172	151	065	075	032	011	032	043	000	000	123.4	4.1%
	0.000	.005	.116	.152	.152	223	076	112	049	031	031	013	005	022	013	126.0%	3.6%
	0.000	.000	.024	.167	.190	286	095	143	000	024	024	024	024	000	000	123.8%	3.4%
	0.000	.016	.078	.109	.172	234	109	016	078	047	031	000	031	078	000	137.7%	3.8%
	0.012	.049	.074	.210	.222	136	049	049	062	037	012	012	000	037	037	135.4%	3.4%
	0.032	.063	.168	.131	.116	074	063	074	032	053	000	074	021	095	000	130.7%	2.9%
	0.120	.040	.173	.067	.080	067	080	120	053	040	067	013	027	027	027	119.9%	3.3%
	.012	.016	.080	.122	.159	.184	.103	.098	.063	.037	.027	.023	.020	.039	.016	138.6%	3.4%

Table 18

Growth Rate in Earnings 1955 to 1969 by Earnings Percentile in 1955

Some College

(Y69-Y55)/Y55 = growth rate

.le	<0	0 <.25	.25< .50	.50 <.75	.75< 1.00	1.00< 1.25	1.25< 1.50	1.50< 1.75	1.75< 2.00	2.00< 2.25	2.25< 2.50	2.50< 2.75	2.75< 3.00	3.00 5.00	>5.00	mean growth rate	mean com'd annual growth rate
	0.000	.000	010	040	102	163	061	112	092	071	061	030	051	133	082	267.5%	6.9%
	0.008	.000	008	076	114	152	167	106	083	076	030	045	023	076	038	175.9%	5.1
	0.000	.009	009	072	153	198	090	108	063	108	036	036	027	072	018	180. %	4.9
	0.000	.000	042	073	125	188	208	104	146	031	042	010	010	000	010	167.1%	4.5
	0.000	.009	050	161	120	190	046	143	074	065	032	037	018	051	005	155.0%	4.2
	0.000	.000	040	140	180	100	160	100	080	060	020	000	020	080	020	171.5%	4.0
	0.000	.045	112	067	123	202	125	045	067	067	011	022	034	034	034	161.7%	4.3
	0.007	.067	081	101	135	121	128	095	054	034	067	014	034	054	007	170.2%	3.7
	0.000	.066	041	082	131	139	106	082	090	032	024	041	041	090	033	170.0%	4.1
	0.081	.060	081	126	104	096	067	067	074	059	037	022	022	089	015	149.5%	3.1
	.011	.022	.049	.099	.126	.158	.108	.101	.081	.061	.032	.029	.028	.067	.024	147.4%	4.3%

Table 19

Growth Rate in Earnings 1955 to 1969 by Earnings Per

Bachelors Degree

(Y69 - Y55)/Y55 = growth rate

ile	<0	0 <.25	.25< .50	.50 <.75	.75< 1.00	1.00< 1.25	1.25< 1.50	1.50< 1.75	1.75< 2.00	2.00< 2.25	2.25< 2.50	2.50< 2.75	2.75< 3.00	3.00 5.00	>5.00	mean growth rate	mean com'd annual growth rate
	0.000	015	015	015	105	045	060	075	119	105	105	015	045	164	120	308.7%	7.5%
	0.000	011	000	011	066	120	099	120	176	099	088	066	000	179	015	204.4%	5.9%
	0.000	016	000	078	094	125	063	172	094	063	047	047	063	109	030	193.8%	5.7%
	0.000	000	000	032	138	053	213	138	106	096	043	043	043	074	021	193.4%	5.3%
	0.004	011	011	044	063	170	159	144	096	077	074	022	019	067	037	175.4%	5.3%
	0.000	000	016	063	143	222	111	079	143	079	048	048	000	016	032	192.6%	5.0%
	0.008	008	031	039	086	094	180	117	141	164	016	023	008	078	008	171.8%	4.8%
	0.000	010	019	058	082	159	037	192	101	043	067	029	019	082	053	192.3%	5.3%
	0.011	040	038	048	136	115	107	079	085	073	068	040	011	102	024	179.4	4.9%
	0.072	039	112	086	065	112	112	119	066	033	033	026	026	105	007	141.3%	3.7%
	.012	.017	.029	.050	.091	.126	.125	.130	.106	.078	.059	.033	.021	.089	.034	187.7%	5.0%

Table 20

Growth Rate in Earnings 1955 to 1969 by Earnings Percentile in 1955

Graduate Training

(Y69-Y55)/Y55 = growth rate

le	<0	0 <.25	.25< .50	.50 <.75	.75< 1.00	1.00< 1.25	1.25< 1.50	1.50< 1.75	1.75< 2.00	2.00< 2.25	2.25< 2.50	2.50< 2.75	2.75< 3.00	3.00 5.00	>5.00	mean growth rate	mean com'd annual growth rate
	0.000	012	000	000	012	047	082	071	071	094	094	071	035	247	165	4.147	
	0.000	020	000	010	051	051	141	162	111	131	051	101	051	080	040	2.176	
	0.000	000	014	028	069	111	125	111	097	139	028	042	069	097	069	2.275	
	0.000	000	027	000	040	107	200	107	173	040	067	040	053	120	027	2.085	
	0.005	000	010	055	050	155	100	130	100	095	085	035	050	110	020	1.766	
	0.000	000	028	028	028	083	278	111	111	111	056	056	000	056	056	2.214	
	0.014	014	028	028	056	111	111	194	111	083	042	083	070	042	014	1.827	
	0.000	008	023	039	094	148	133	109	117	094	039	023	055	094	023	1.879	
	0.000	028	019	009	075	123	104	142	113	094	009	066	028	142	047	2.173	
	0.080	030	100	050	110	080	090	100	060	030	030	060	020	110	050	1.702	
	.010	.011	.024	.029	.061	.110	.123	.124	.105	.090	.052	.054	.045	.113	.046	2.191	

few observations, within these tables, the differences in the distribution by row are significant. Thus we can conclude that results in table 2 don't occur because high school graduates are more concentrated in the lower percentiles in 1955.

In the appendix, we present several equations in which the dependent variable is (Y69 - Y55)/Y55. (The reader who wishes to examine the determinants of Y69 - Y55 can do so by subtracting the 1955 regression from the 1969 one). The first equation contains all the variables used in the final equations for 1955 and 1969 in chapter 4. The second equation adds Y55 to the first.

We will concentrate first on the second equation which contains Y55 and which has an R^2 of .20. The inclusion of Y55 in our equation means that we have held constant all theother systematic determinants of Y and its percentage change including luck and K55 -I55 where K55 is the stock of investment in one the job training and I55 is the investment in that year.[128,129] But the coefficients on the other variables in this equation represent the effect of each variable on the growth rate, net of the effects passed on through Y55.

The higher is a person's 1955 earnings the slower is his growth rate.

---

[128] We have expressed the on the job training variable in this way to be in accord with Mincer's model, as explained below.

[129] It can be demonstrated that if we compare the estimates of $Y = Xd + Ze$ and $Y = Xf + (Z + Xb)g$ that our estimates of g and e would be identical while the estimate of f would equal that of d - bg.

The coefficient of -.09 is highly significant with a "t" value of 19. As just explained, the coefficient on the earnings variable represents the effect of all the unmeasured variables. Results presented later would suggest that one of the unmeasured variables that is important is luck. The on the job training variable, K55 - I55, may also be important though tests of the theory presented below tend to conflict with Mincer's theory.

Previous research based on crosssection data has shown that age earning profiles tend to be steeper for the more educated. Using the same people at different points of time, we also find that the average growth rate increases continuously with education (except for some graduate) with most of the difference from high school graduates being statistically significant. The coefficients on the education variables are larger than most of the other coefficients though attending private elementary school is the single largest coefficient.

While the average growth rate increases monotonically with ability, none of these coefficients are significant at the 5% level. There are, however, several interesting variables, which have significant and large effects. For example, those who are Jewish have a growth rate 21% points above that of Catholics. Several other SES variables are also significant. For example those who attended private elementary school have a growth rate 80% higher than those who didn't. Also mother-in-law's and father-in-law's education are both significant and positive.

Of the time spent on youth variables, sports and part time job have significant positive effects while chores has a significant negative

effect. The nonpecuniary variables are significant with the exception of helping others and job security, which is significant at the 6% level. Those not interested in future financial prospects, nor in challenging work, have a slower growth rate which also is true for those interested in independence in their work. The people who prefer to be salaried have a 10 percentage point slower growth rate.

The age variable has a negative coefficient implying a concave earnings function. The positive sign on year of first job also implies concavity but this coefficient is only significant at the 5% level.

Those who were self employed in 1969 have a faster growth in earnings. Increased hours on first job in 1969 also lead to a faster growth rate but the opposite is true for hours on second job.[130] Those who moved inter-regionally after 1955 have a faster growth rate as do those who live in bigger cities in 1969. Good health in 1969 as reflected in weeks lost from illness and weight - are associated with higher growth rates.

We have reestimated the equations dropping the variables that pertain exclusively to 1969. The general results are unchanged.

The equations clearly indicate that there are important systematic elements in the distribution of growth rates from 1955 to 1969. Is an underlying structure that explains which of the determinants of earnings in 1955 and 1969 are also significant in the growth rate equations?

---

[130] This may be because the 1969 earnings are only for main job while the 1955 earnings may include all jobs. However, this variable seems to represent those people with low wage rates who work hard. Thus it may be representing some of the forces in Y55.

In Mincer's theory, differential growth rates reflect differential investments in O.J.T. Thus the more educated, those whose in-laws have high education, those who attended private elementary school, those who do not want to be self employed, don't want to be independent, are not interested in future financial success and who are Jewish, all invest more than the omitted categories. Mincer may be right, but one still wonders why these groups are different.

An alternative explanation is that because of uncertainty, people have to demonstrate their competence on the job which determines how quickly they ascend their career ladders. There are different career ladders with different characteristics. Some careers are relatively safe but as a consequence have both a relatively low ceiling on earnings and a narrow distribution of outcomes. Other careers have higher earnings ceilings but more risk. Because people are relatively risk averse the latter careers have higher average earnings. The difference in earnings between ladders is greater for older person's because the sorting process takes place sequentially over time and people only gradually reach the upper parts of the heirarchy.

This explanation, which can be applied easily to the risk preference and other nonpecuniary variables, can also explain why the other variables are significant. For example, the in-law and private school variables can be interpreted as proxies for nepotism. In an uncertain world a nepotistic system can function by a person be given a secure

job and then only if he has the ability is he promoted (though his promotions may come faster for equal ability). Since there are pay scales within a firm, even the owner's son will only receive very high earnings if he holds an important job. We have argued earlier that the religious variable is associated with drive and hard work , but such effort may only pay off cumulatively. Finally, the educatio findings reflect the types of career ladders chosen by the more educated. Very few of our college graduates worked at any job but owner /manager, salesman, or professional. Their choice may have been based on opportunities or preferences but in any event these can be the careers within which sorting is important and ceiling earnings are high.[131]

Test of Predictions of Some Earnings Distribution Theories

We begin the discussion with the stochastic theories.[132] In these models initial earnings depend on an individual's capacity but the change in earnings depend on luck. Let the earnings of the ith individual in year t be represented by Y_{it} and the random event by e_{it}

---

[131] Even if this alternative explanation is correct, Mincer's theory may be correct in a formal sense. Lifetime earnings within career ladders can be adjusted so that they are the same net of risk premiums and non-pecuniary rewards. But even here, the increase in earnings need not be due to on the job training but could solely reflect the firm's learning by observation, though a combination of the two learning mechanisms seems more likely.

[132] See Mincer [35] for an interesting survey and analysis of these theories. The original work in this area is due to Aitcheson and Brown, [1] Champernowe, and Rutherford, and Mandelbrot [29, 31]. Various assumptions about the distribution of the e's and about the validity of 1) or 1a) can lead to a normal, log normal or Pareto or other distributions.

which is assumed to be distributed independently of Y_{it-1}. The stochastic theories can be written as:

$$1) \quad Y_{it} = Y_{it-1} + e_{it} = Y_{io} + \sum_{j=0}^{N} e_{ij}$$

$$1a) \quad \ln Y_{it} = \ln Y_{it-1} + e_{it} = \ln Y_{io} + \sum_{j=0}^{N} e_{ij}$$

If the e's are serially independent, the distribution of Y_t will depend solely on the distribution of e_t after a long enough passage of time. Moreover with this assumption, the stochastic theories predict that the variance of earnings (or of its log) will increase continuously with time.[133] These models either do not explain why education, ability, etc. are correlated with earnings or they allow the correlation only with Y_{io}.[134] In the latter case, these theories predict that the correlations with education, etc. with Y decline over time since the variance of Y_t increases.

The stochastic theories require that either the difference or the percentage change in earnings be independent of the level of earnings. But table 2 indicates that the mean growth rate in earnings is different at the highest and lowest levels of 1955 earnings and that those with high earnings in 1955 have distributions with fatter tails. The difference in mean growth rates can be attributed to transitory effects that do not become impounded into a person's earnings base, but such an explanation

---

[133] This is the assumption normally made and the one we will test. However, it is important to note that Kaldor [23] assumes the e's to be serially dependent. He is interested in finding conditions on the correlation of the e's so that the variance of earnings would be constant at all ages, which is contrary to fact. It would be possible, however, to generate any pattern on the tim profile of the variance in Y_t by making the appropriate assumptions on the correlations of the e's.

[134] The stochastic processes theories also provide no explanation of why age earnings profiles slope upward or why the steepness varies with education.

is not in accord with the Markov assumptions of the stochastic models. As is evident from the pattern of the percentage changes and has been confirmed by direct calculations, the average difference in earnings increases with the level of Y55. Thus models expressed as equation 1 are also rejected by our data.

Since in Markov models, the education and other variables are correlated with Yo only, the variance explained by such variables should decrease as people age. But education, ability, family background, and other characteristics have an R^2 of about 4 points higher in 1969 than in 1955 even excluding the information pertaining to 1969.

Investment in On the Job Training Models

Next let us consider the investment in on the job training theory as presented by Mincer [35]. His model can be thought of in the following terms. Suppose skills learned on the job increase a person's marginal productivity to many employers. If an employee who receives general on the job training is legally free to accept any job offer at any time, after finishing his training he will be paid a wage equal to his new, higher marginal product (in a competitive market). Next suppose occupation A gives no general training and will pay a person the same wage rate throughout his lifetime but occupation B involves general training and has a rising age earnings profile for an individual. A rational person would choose the occupation whose earnings stream has the larger present discounted value. But Mincer argues that with free entry into both occupations, the present value of the two earnings streams will be equalized. Hence, since a person will receive a real wage equal

to his marginal product after training, he must be paid less than his marginal product while being trained.

Mincer expresses his theory as:

$$2) \quad Y_{it} = \bar{Y}_i(1 + r \sum_{j=0}^{t} \lambda_{ij} - \lambda_{it})$$

where $\bar{Y}$ which depends on schooling, ability, etc. is the constant earnings of a person who never invests on the job, λ is the fraction of earnings invested, and r is the rate of return on investment on the job. Mincer assumes that investments are a monotonically decreasing function of age.[135] The change in earnings, $Y_{t+1} - Y_t$ can be written as $\bar{Y}(r\lambda_{t+1} - (\lambda_{t+1} - \lambda_t))$, which will be positive if λ decreases with age.

Mincer has designated as the overtaking point that year in which $r\Sigma\lambda_{ij}$ equals λ_t or when $Y_t = \bar{Y}$. Suppose for the moment that everyone was at the overtaking point at one year. Further assume that $\bar{Y}$ is not correlated with investment (or Ai in equation 3 below) though Mincer's theory does not rule out such correlation.[136] Assuming that λ_t differs by individual, people with the same $\bar{Y}$ and different investments will have different changes in earnings subsequently. If the distribution of λ is independent of $\bar{Y}$, so also will be the percentage changes in earnings. Thus when examined at the overtaking point, Mincer's theory yields the same testable hypothesis on growth rates as the stochastic theory as expressed in equation 1a).

---

[135] When we apply the tests we will reconsider the effects of this correlation.

[136] See [30] . Ben Porath has shown analytically that such a pattern will often arise from utility maximization behavior.

Mincer's model, however, yields different predictions when growth rates are calculated from a year that is not the overtaking point. We can see this best if we specify the on the job training investment function. Mincer in his analysis often assumes that the individual's investment paths are exponential as in equation 3).

$$3) \quad \lambda_{it} = A_i e^{-b_i t} \qquad 0 < A_i < 1,\ b_i < 0$$

The implications of this investment equation (as well as one with a linear time trend) for testing this hypothesis which are derived in will be summarized here. Mincer usually restricts b_i to be the same for all individuals while letting A_i vary. In this case a length of the overtaking period is the same for all A_i (and r) though the actual overtaking year will vary for people of the same age because of differences in time spent in school and military service. Mincer's model, therefore, predicts that those with the higher A_i will have higher growth rates in earnings.

If we knew A_i for each person, we could test the theory directly. We can, of course, calculate the average earnings a person with given set of measurable skills would receive, but the difference between an individual's actual earnings and this average would be an imperfect estimate of A_i since other unmeasured skills would also be in this residual. However, as long as we are willing to assume that A_i is not correlated with $\ddot{Y}_{ij}$ (or the unmeasured skills) we can classify people into groups between which the average amount of A_i varies. That is in years earlier than overtaking, those (with the same education, ability, etc.) who are investing more must be earning less and the earnings figure (perhaps

adjusted) can be used as an instrumental variable or proxy for A_i.

Similarly, those who invest more will have a higher growth rate in earnings. Moreover those who have below average earnings in the pre-overtaking years will have above avenage earnings after overtaking.

According to Mincer, the overtaking point occurs in no more than 1/r years of work experience or probably less than a decade. In 1955 in NBER-TH sample the length of time in the civilian post World War II labor market is 8 to 10 years of most high school graduates, 7 to 9 years for most of those with some graduate work and 5 to 8 years for those with one or more degrees.[137] As a first approximation we canassume that everyone was at the overtakingpoint in 1955. But in this instance, Mincer's and the stochastic theory generates the same hypothesis which we have already rejected.

Because the more educated have worked fewer years and because individuals follow different investment paths, it is unlikely that <u>all</u> individuals are at the overtaking point in 1955. Mincer often specifies as his investment function equation 2) with bi equal to $\bar{b}$ for all persons. For this investment function, the overtaking period is the same for people with the <u>same education</u> (who begin work in the same year). But when we examine the distribution of growth rates within education groups, as in tables we find the same pattern of results as above and this pattern is unaltered if we standardize the observed growth rates or the 1955 level of earnings for differences in age and time on the job.

---

[137] About 1/2 of the high school graduates and 1/3 of the some college graduates began work before 1942.

Suppose that contrary to Mincer the b's differ but on average people in all educational levels were at the overtaking point in 1955. Since earnings increase with education, on the average people with high education but low earnings in 1955 must be investing more than people with less education and the same earnings.[138] But those people with less education and high earnings in 1955 must be investing less than the more educated. Thus at each level of 1955 earnings, the mean growth rate should increase with education as is found in tables 3-6. But under the same assumption, within an education class those with smaller earnings in 1955 must on average have been investing more than those with more earnings. Hence, the mean growth rates should be inversely related to 1955 earnings within each education group.[139] Yet in tables 3-6 the mean growth rates are constant except for the very top and bottom tenths.

It is possible that high school graduates are beyond the overtaking point - especially since 1/2 of this group began work before World War II while those with one or more degrees have not yet reached the overtaking point. When either A or b vary in equation 2) the profiles will continue

---

[138] This argument assumes that the other positive determinants of earning are not negatively correlated with education. However, we have recalculated tables 2-6 adjusting Y and $\Delta Y/Y$ for differences in all significant variables, e.g., we subtract out the average difference in earnings between those in the bachelors and high school group or the top and bottom fifth, etc. The adjusted tables yield comparable results(?).

[139] This tends to happen in the compound growth rates but the differences are not significant.

to fan out beyond the overtaking point (as long as investment continues). While for those people not yet at the overtaking point, those investing more in 1955 should have the higher growth rate. In this case the correlation between mean growth rates and 1955 earnings level should be positive for high school graduates and negative for college graduates. But in tables 3-6, once the top and bottom fifths are eliminated, there is not correlation at any education level in the average growth rates and a slight negative correlation at any education level in the compound growth rates.

The classification by observed percentiles in 1955 may be affecting the test of Mincer's theory since his formulation does not deny that an individual's earnings in a year may be affected by random events. Suppose such events are transitory so that, ignoring the on the job investments, $Y_t = \bar{Y} + e_t$. Then as in Friedman[/6] we would expect the top and bottom tenth of 1955 earnings to include a larger proportion of those with large positive and negative e's. But with transitory events uncorrelated over 14 years, we would also expect those at the top in 1955 because of large positive e's to have low growth rates, etc. Replacing the observed fraction of people in the top tenth in the left hand cell with the overall sample percentage the average growth rate becomes about 1.8 while a comparable adjustment for the right hand cell for the bottom tenth reduces its average growth rate to about 2.2. If these numbers are to be trusted, table 2 would yield a U shaped pattern of average growth rates which is not consistent with either the Mincer or luck theories.

In making these tests, we have consistently assumed that investment (or A_i) was not correlated with $\bar{Y}_i$. It is this assumption that, for example, allows us to say that people with a given education and low 1955 earnings must on average contain the people who are investing more.[140] Mincer's theory does not rule out either positive or negative correlations, which if large enough could destroy our ability to distinguish groups with more or less investments in on the job training.

There are several possible responses to this point. First our equations indicate which variables have a significant effect on the growth rate in earnings, which indicates differential investment. Standardization for these variables (on the growth rate and on Y55) does not alter our conclusions though, of course, our equations do not explain a majority of the variance in earnings or its growth. Second if Mincer is not willing to specify the correlations a priori, then it will be difficult to distinguish his theory from stochastic ones since it is always possible to find certain patterns of correlations among the error terms to generate any age profile of variances.

The essence of Mincer's argument is that labor markets functions well. There are several reasons why our data might reject the investment hypohtesis, though Mincer's theory (with no correlation between A_i and Y_i) might be a partial explanation of earnings and the labor market. By 1955 the market might have adjusted for <u>expected</u> wage changes that were <u>not</u> realized.

---

[140] The argument is the same as Friedman's [/6], as to why people with low observed income on average should have negative transitory income.

But if forecasts are generally incorrect, it is difficult to consider how investment models can ever be verified with either cross section or time series sample or more importantly how such samples can be analyzed within the context of equilibrium investment models.

Second Mincer's formulation only applies to general on the job training. No one has yet analyzed the implications of firm specific training on earnings profiles though some arrangements must lead to rising profiles.

Sorting, Uncertainty, and Heirarchy Models

Another explanation of the change in the earnings distribution with age is provided by a sorting uncertainty model. That is suppose that employers are uncertain about a person's overall skill level because performance depends on many skills some of which are difficult to test for in advance. The firm can react to uncertainty in many ways. One particular method, which may be very relevant in a heirarchial structure, is learning by observing. In this model firms initially place an individual in a job which is an entry position for one or more career paths.[141] Then firms make successive decisions to fire, retain or promote on the basis of both the observed and required competency in the particular position held and the number of jobs openings in the next rung. People will be promoted faster the more competence they demonstrate and the quicker positions that they are qualified for open up.

Let us equate the positions with earnings and denote a person's maximum earnings capacity as Y_i^* which is a function of education, inherited skills, etc. A person's prgoress towards Y^* is represented by an

[141] The initial assignments may be based on "signals" such as education, sex, age or various aptitude tests.

adjustment process

$$5) \quad \ln Y_{it}/Y_{it-1} = \alpha_{it} \ln Y_i^*/Y_{it-1}$$

We would expect α to vary over individuals and over time because of the difficulties of different supervisors learnings about the individual and because appropriate openings may occur randomly. In addition since Y* is not observable we expect a distribution of growth rates for people at Y_{t-1}.

This model has certain characteristics that are different from those of Mincer and are capable of empirical verification or refutation. For example since promotions depend on prior job performances, the most able should, on average, be promoted faster and always have a larger growth rate in earnings. But for a given α , the variance of Y will increase continuously with age.

Second this model does seem to provide a consistent explanation of which variables determine the growth rate in earnings. The sorting model postulates that initially employers have very little information on a worker's productivity but that over time employee quality is rewarded through faster promotions. The larger growth rate in earnings by education level - demonstrated in tables and in is in accord with this prediction. However, the same regressions indicate that mental ability only has a weak effect on earnings' growth rate. More positively the theory does provide a rationale for the other variables significant in the growth rate equations, as given above.

The remaining pattern of results in table and is explanable

within the sorting theory. Those whose 1955 earnings are well below (above) average must include more temporary under - achievers (low achievers) and should have the faster growth found in the bottom(top) tenth. Suppose that Y* is much greater for the "best" workers and that Y55 is an imperfect predictor of who is "best". Since 1955 is still fairly early in their working life, the best could still have the lowest 1955 highest earnings growth rate. The constancy of the mean growth rate between the 10th and 90th percentile may reflect the downward pull of people who in 1955 were at or above their potential, offsetting the higher growth rate of the more talented.

It is unfortunate that only the 1955 and 1969 data are, as yet, available since a more definitive test of these two models rests on whether those with low earnings in the early years have high or low earnings beyond Mincer's overtaking point. Since Mincer's theory is much more tightly specified than the sorting theory, it is easier to find ways to reject it and the rejection is not based on overwhelming evidence. Thus it might be fairer to say that the sorting should not be given any more precedence than Mincer's model.

VII. Conclusions and Questions

Empirical Results

In our regressions we have found a number of significant variables, many of which have never been examined before. Nearly all these variables have the same sign in equations explaining earnings in widely separate years and also have what we consider to be consistent signs in equations explaining educational attainment, test scores, and assets.

In the earnings equations we find that educational quantity and quality, mental ability, business assets, certain aspects of family background (discussed below), preferences towards risk and towards nonmonetary aspects of a job, locational information, hours of work, health, and work experience and age are significant determinants of earnings. Among this list of items are several, which to my knowledge have never been found significant in earnings equations, partly because they have never been studied. But the empirical results are in accord with economic and social science theory. For example, economists and others have long recognized that people can trade off earnings for nonpecuniary rewards, but information on what nonpecuniary rewards are traded off with earnings and the importance of such rewards are not available.

Our family background variables are much different than in most other studies. For example parent's or especially fathers' education and occupation are often used as the major index of SES. Though we started off using these variables, we found that they became insignificant especially when

business assets were held constant.[142] This suggests to me that education and occupation act primarily as proxies for financial and business inheritance perhaps tinged with nepotism and not for home training. (Since parental education is associated with the educational attainment and test scores of respondents, we are only speaking of direct effects on earnings.)

While the traditional SES variables are not significant we have found others that seem to be related to the types of family life, and child rearing processes that people have in mind when they talk of training and taste formation. For example, we find that Jews earn significantly more than and Protestants significantly less than Catholics (and the few aetheists and agnostics). Other studies have found that Jews of this and surrounding generations have more drive and motivation for financial success - perhaps because of fear engendered by centuries of economic insecurity and because most of them were children or grandchildren of immigrants who were poor and wanted to succeed. The Protestant-Catholic result may be attributable to the Protestants in this group coming from wealthier families who did not need to emphasize economic success. While this conclusion may seem contrary to the Protestant ethic, others in small samples have found that some Catholic groups - such as German or French - do better than the average Protestant. Given the education cutoff, in our sample and the cohort involved, it seems likely that we have drawn Catholics from the above average earnings group.

---

[142] Parental occupation and education is contained with unknown weight in our biography variable. As argued in Chapter when one variable, X, is already included in another one variable Z with a weight of b, the estimate coefficient on X is equal to c-bd where c is the true effect of X and d the true effect of Z. Thus estimated coefficient is a net effect. But these were significant before business assets were added.

We also find that those who attend private elementary school and high school earn about $5,000 a year more in 1969(in 1958 prices). While there are a number of explanations for this result the one that appeals to me is that these people come from very wealthy families who use pull to advance their sons.

Another aspect of religious upbringing that affects earnings is frequency of attendance at religious(not parochial) school with those attending most often earnings the least and those never attending earning the most. The ones who attended more than twice a week are probably certain subgroups of Catholics and more orthodox Jews. This variable may help to distinguish those less interested in a material life. The non-attendees are more difficult to explain though nonattendance in the 1920's or early 1930's may represent a very atypical family.

We also find that those who spent their time differently on various activities while growing up earn different amounts. The explanations for these findings include indication of respondent's tastes and attitudes as well as certain types of family rearing. For example, we argued that respondents who remembered spending time on chores, came from families that are interested in conformity and produce people who enter into bureaucracies and safe jobs.

The more educated earn more though the graduate coefficients are not always higher than the bachelor's coefficients.[143] The effects of education

[143]The inclusion of various nonpecuniary and attitude variables generally raises the coefficients on graduate education.

increase with age and the age earnings profiles are steeper for education than most other variables. However, in this sample which is stratified differently than the population and has a truncated distribution of education and ability, the (average) range in earnings arising from education are dwarfed by the range arising from the combination of SES or of trade-offs for nonpecuniary rewards and are only of the same magnitude as the range associated with mental ability.[144]

Mental ability has a continuous direct effect on earnings (as well as indirect effects through educational attainment). The age earnings profile slope upward with only a tendency for the more able to have significantly steeper profiles.

Risk premiums, and nonpecuniary trade offs are also a greater percentage of earnings as people age. Given the crudeness of measures,(0,1 dummies) it is not surprising that variables such as job security and prefer to be salaried , both of which are related to risk avoidance, have separate effects. Combining these different variables and others such as chores and SES proxies into categories, the impression that comes through is that those who take safe, unchallenging and conventional jobs progressively fall further behind in earnings. That is, the high paying jobs are at the top of certain career ladders and cannot be reached by people on other ladders.

Time on the job is important especially early in a person's career but experience in some types of work is more transferable than in others types. However, people generally do best when they do not switch

---

[144]It appears that much of the variability in test scores is genetic in origin.

occupations. It also appears that hours worked is an important determinant of earnings (though the data is only available for 1969). However, there are a large group of men who moonlight because their earnings are low.

Business assets as measured in 1969 are one of the most important variables in our equation explaining 10 percent of the variance in earnings by itself. The coefficient is .11 in 1969 which is not extremely high on a before tax basis.

We have also calculated the same equations within various occupations. Since many of the above variables are related to occupational choice, coefficients tend to be smaller and less often significant. But we do find clear evidence that some skills, attributes, etc. are more important in some occupations than others. For example intelligence is more important for the self employed. Moreover the self employed who are the ones who have more control over their work environment, have larger coefficients on the various nonpecuniary measures.

We can explain moreof the variance in earnings in 1969 than in 1955 even when we restrict our attention to variables equally accurate in both years, i.e., when we ignore business assets, etc. Second, the truncated education variable has a partial R^2 of about .05 though some of the effects of education may be impounded in the nonpecuniary and other variables. The biggest partial R^2 in each year is attached to the 1969 business asset variable. This result probably does not generalize to the population since we have a high proportion of self-employed, and several with large amounts of business assets. The SES variables (including all the time spent variables)

---

145 The skewness of kurtosis measures or divided by σ^3 and σ^4, respectively which we allow to vary by what is held constant in the numerator. Also we subtract 3, the expected value of the normal curve in the kurtosis measure.

and the nonpecuniary variables (including preferred to be salaried) each explain about 3% of the variance in the two years.

Most of the variables have little or no effect on our relative skewness and kurtosis measures. However, business assets, attending private elementary and high school, the nonpecuniary variables and the time spent all reduce skewness and kurtosis sharply in 1969.

Methodology

Perhaps the simplest way to describe the methodological advances we have made is that many phenomena, skills, and attitudes that economists, sociologists, biographers and others have hypothesized should be related to earnings, can be represented or captured by simple questions that can be included in mail surveys. It seems likely that more systematic efforts would allow us to incorporate many other skills, attitudes and preferences or to refine existing measures. The payoff from our work in understanding the earnings distribution appears large and promises adequate pay offs for other work in the area.

Relationship of Theory to Empirical Work

At the beginning of this paper there was a lengthy discussion of various theories, hypotheses, and ideas that have been advanced to explain various features of the distribution of earnings. Our empirical results do shed some light on the validity and importance of many of these. For example Friedman suggested that skewness arose because of differences in risk preferences. The variables which are related to risk preferences include the prefer to be salaried item, the entered occupation because of job security item, and the time spent on chores item.[146] In each year, we find that

[146]Our argument is that the people came from homes that breed conformity.

those that want to avoid risk earn significantly less and that the differential grows with age and is a greater percentage of average earnings (of high school graduates) as people age. Finally, we find that risk preferences have an indirect effect with those who want to avoid risk obtaining less education. These conclusions are reinforced by the corresponding findings on the role of business assets.

Avoidance of risk can be considered one type of nonpecuniary reward. We find that tastes towards other types of nonmonetary returns also show up as a reduction in earnings - presumably through the type of occupation in which a person chooses to work. We find that those who want interesting work, or to help others, or who are not interested in future financial success earn less and that these differentials increase with age. But these variables do not contribute to skewness and kurtosis.

We also find evidence that those who are willing to work hard or have drive or concern for financial success receive much more earnings. These conclusions are based on the effects of religion, part-time job while growing up, and entered occupation because it(work) was challenging. These variables have larger effects over time.

These last several sets of results also suggest that models which emphasize that training and taste formation (on earnings related aspects) occur in the family, religious institutions, and within peer groups have a large grain of truth in them. However the lack of significance of parental education and occupation suggest that education is too crude an indicator of the differences in upbringing.

Many people have argued that a good portion of earnings differentials arise because of family pull. While we have no variable which is an unambiguous measures of nepotism, we have several which lend themselves to that interpretation. This, for example, is the simplest explanation of the in-laws education results and why the inclusion of business assets wipes out the fathers education coefficients. Nepotism and/or inheritance of controlling interest in a business seem to be likely explanations of why the 22 people who went to private elementary and high school earn on average up to 50 per cent more than people who went to public or parochial school.[147]

Some theories such as the one that goes under the general title of human capital are more general in nature. To the extent that the human capital model means that people can improve their earnings capacity by expending time and resources on schooling or informal training, we find strong support in our analyses. The education coefficients are significant and large. Certain types of family environment and childhood

---

147 There is also indirect intergenerational earnings transfers via educational attainment and inherited intelligence.

activities are also significant. But the human capital model often is presented as one in which people invest rationally, i.e. invest to the point where the rate of return on the last dollar equals the cost of capital. This proposition is very difficult to test because many of the returns to education are of a nonmonetary variety, have not been examined in this study, and are not easy to convert into monetary equivalents.

Mincer, in a brilliant series of pieces, has demonstrated that if all on-the-job training is general, that all returns to such training are in monetary terms, and if the market functions as a competitive market would, then the human capital model would predict that age earnings profiles would rise with age for investors and that the more investment the steeper the profile. His model also predicts that the labor market adjusts occupational wages so that the present discounted value of lifetime earnings would be the same (to marginal choosers) in relevant occupations. In its most general form, this theory is a tautology with, for example, the amount invested in a year adjusting to make equations into identities. But with restrictions the theory can be tested. We have performed certain tests under the assumption that differences in investment are not correlated with $\bar{Y}$ which is the constant earnings a person would have received if he never invested in OJT. We also performed our calculation after adjusting for those variables which we correlated with OJT investment propensity. We find evidence in Chapter that is at variance with the Mincer model given our no correlation assumption. We also find some evidence that skills

learned in one occupation may not be as transferable to another occupation as "home grown" skills. This suggests that all training is not general.

We have also examined stochastic models. Since these can be represented as difference equations or Markov chains, it is also true that these models can be used to explain any age profile of variances of earnings as well as generating skewed models. But the most common stochastic models assume that errors are uncorrelated. We find several pieces of evidence at variance with this view. For example, the percentage change in earnings from 1955 to 1969 is not independent of 1955 earnings level and the R^2 of the systematic elements increases over time though the stochastic model implies a decrease.

The sorting-uncertainty model, which I believe in, receives some support from these findings. In part this support is in the growth in importance of the effects of education and ability since these determine potential earnings. Additional support comes from the growth in the differentials associated with drive, risk aversion, willingness to work hard, etc., as summarized above. That is, these subjective measures are best displayed on the job. The differential of 1955 experience on 1969 earnings would be consistent with this model. We have reexamined the screening model of TW which is based on easy to measure education being used as a barrier entry. The tests, which were derived in TW, still indicates that screening may be important.

Problems and Extensions

Several different types of problems remain. First, our interpretation of many of the new variables we have used may be wrong. It would be very useful for some one else, perhaps a psychologist or sociologist, to test, validate and improve our measures of risk aversion, eleemosynary behavior, etc. Second, we have spent very little time examining interactions which may be very important and whose omission may be biasing some of our results. Third, we have not related our various cross-section periods to macro, time series developments. Fourth, the results are only generated within an atypical sample of a cohort which in turn may be atypical because of war experiences and the Depression and because the economy and society are much altered now. Thus many of our findings must be subject to replication in other groups before being accepted as not false. Finally we have not made much progress on the nature/nurture or genetic/environment explanations of the distribution. Hopefully progress on this issue will be forthcoming soon.

Appendix A: Regressions

Independent Variables	(2) Y55 coef	t value	(2) Y69 coef	t value
Education:				
Some College	-.21	1.0*	1.10	2.0
Bachelors	.13	.6*	.16	.3*
Some Grad	-.05	.2*	.01	.0*
Masters	-.15	.5*	.15	1.6**
PhD+LLB+MD	.22	.5*	.52	2.6
LLB	-.38	.8*	.12	1.1*
MD	3.49	5.3	.13	2.9
Ability:				
2nd Fifth	.28	1.6*	.54	1.4*
3rd Fifth	.31	1.9*	.71	1.9*
4th Fifth	.56	3.3	1.40	3.7
5th Fifth	.82	4.8	1.98	5.1
Biography:				
2nd Fifth	.21	1.5*	.56	1.7*
3rd Fifth				
4th Fifth	.66	4.5	.80	2.4
5th Fifth				
Father Ed				
Mother Ed.				
Religion:				
Jewish	2.00	7.7	4.13	7.0
Protestant	-.15	1.3*	-.93	3.6
Attended Religious School Often	-.51	2.0	-1.14	2.0
Attended Religious School Never	-.01	1*	-.33	1.2*
Father In Law HS+	.05	3.0	.10	2.7
Mother In Law HS+	-.01	.1*	.57	2.1
Time Spent on Sports	.06	1.7*	.26	2.9
Time Spent on Chores	-.05	1.3*	-.27	2.8
Time Spent on Hobbies	.04	1.0*	-.15	1.7*

Never Moved Before HS	-.06	.5*	-.43	1.7*
Attended Private High School	1.49	3.9	2.80	3.3
Attended Private Elementary School	.23	.3*	2.98	1.6*
Factors Influenced Entering Occupation				
Future Financial Prospects No=1	-.54	4.2	-1.77	6.0
Independence No=1	.27	2.1	1.19	4.1
Challenging Work No=1	-.76	5.0	-1.70	4.9
Help Others No=1	.48	3.8	.86	3.0
Job Security No=1	.48	4.0	1.41	5.2
Prefers to be Salaried	-.37	2.9	-1.00	3.4
Other Assets (Own Business, Real Estate)6	.03	11.5	.12	20.4
Self Employed Businessman, 69	.72	4.4	1.09	2.9
Self Employed Professional, 69	.45	1.7*	3.30	5.5
Teacher, Pre College	-.61	2.4	-1.86	3.1
Hours on Main Job, 1969			.07	4.7
Hours on Second Job, 19	-.03	3.3	-.12	5.2
Weeks Lost from Illness 1969	-.03	1.6*	-.18	3.8
Mobil 1955 to 1969	.08	2.7	.33	5.1
Age	.08	3.3	-.11	1.9*
Year of First Job	-.11	5.1	-.15	3.1
Current Residence in To of 50, to 1,000,000	.46	3.6	1.09	3.7
Current Resident in Ex of 1,000,000	.92	5.1	2.89	7.0
College Quality (Gourm Rating)	.0014	3.5	.0044	4.3

Earnings Equations (169-155)/155

Dependent Variables	1) coef.	t value	2) coef.	t value	3) coef	t value	4) coef	t value
cation:								
ome College	.040	.8*	.070	1.5*	.082	1.7*	.116	2.4
achelors	.143	2.8	.214	4.4	.187	3.6	.245	4.8
ome Grad	.122	1.5*	.173	2.2	.142	1.7*	.180	2.2
asters	.362	4.8	.393	5.4	.332	4.6	.338	4.8
hD+LLB+MD	.487	4.0	.543	4.6	.491	4.1	.511	4.4
LB	.191	1.3*	.176	1.2*	.464	3.1	.493	3.4
D	.793	3.9	1.114	5.6	1.357	6.8	1.676	8.5
lity:								
2nd Fifth	-.009	.2*	.016	.3*	.013	.2*	.038	.7*
3rd Fifth	-.006	.1*	.024	.5*	-.003	.1*	.021	.4*
4th Fifth	.013	.2*	.063	1.2*	.020	.4*	.061	1.1*
5th Fifth	.018	.3*	.098	1.8*	.036	.6*	.098	1.8*
ography:								
2nd Fifth	.008	.2*	.039	.8*	.016	.3*	.039	.8*
3rd Fifth								
4th Fifth	-.080	1.6*	-.035	.7*	-.063	1.3*	-.028	.6*
5th Fifth								
eligion:								
Jewish	.037	.4*	.215	2.7	.203	2.4	.376	4.5*
Protestant	-.036	1.0*	-.049	1.4*	-.023	.6*	-.031	.8*
ttended Religious chool Often	-.009	.1*	-.056	.7*	-.032	.4*	-.071	.9*
ttended Religious chool Never	-.037	1.0*	-.042	1.2*	-.035	.9*	-.037	1.0*
ather In Law HS+								
other In Law HS+	.075	2.0	.077	2.1	.106	2.7	113	2.9
ime Spent on Sports	.014	1.1*	.020	1.6*	.006	.5*	.009	.7*
Time Spent on Chores	-.030	2.1	-.032	2.4	-.024	1.7*	-.027	2.0
Time Spent on Hobbies	-.010	.8*	-.006	.6*	-.016	1.3*	-.014	1.1*
Time Spent on Part-time Job	.017	1.6*	.024	2.3	.016	1.5*	.021	1.9*

Never Moved Before HS	-.012	.3*	-.018	.5*	-.009	.2*	-.013	.4*
Attended Private High School	.005	1.5*	-.001	.4*	.114	.9*	.629	2.4
Attended Private Elementary School	.720	2.9	.790	3.3	.622	2.3	.236	1.9*
Factors Influenced Entering Occupation 0 = 1								
Future Financial Prospects	-.137	3.3	-.188	4.7	-203	4.8	-.261	6.3
Independence	.065	1.6*	.078	2.0	-.039	.9	-.049	1.2*
Challenging Work	-.060	1.5*	-.084	2.1	-.052	1.2*	-.069	1.7*
Help Others	.019	.5*	.052	1.4*	-.049	1.2*	.083	2.1
Job Security	.021	.6*	.069	1.9*	.091	2.3	.139	3.6
Prefers to be Salaried	-.066	1.6*	-.102	2.5	-.167	3.9	-.215	5.2
Other Assets (Own Business, Real Estate)69	.005	1.5*	.013	4.4				
Self Employed Businessman, 69	.405	4.7	.443	5.4				
Self Employed Professional, 69	.080	1.5*	.146	2.8				
Teacher, Pre College 69	-.08	.9*	-.126	1.5*				
Hours on Main Job, 1969	.011	5.5	.010	5.2				
Hours on Second Job, 1969	-.007	2.0	-.010	3.1				
Weeks Lost from Illness, 1969	-.017	2.6	-.020	3.1	-.018	2.7	-.020	3.1
Mobil 1955 to 1969	.028	3.1	.036	4.1	.022	2.4	.026	2.9
Age	-.029	3.7	-.022	2.9	-.027	3.3	-.021	2.7
Year of First Job	.021	3.0	.012	1.8*	.016	2.3	.009	1.3*
Current Residence in Town 50, to 1,000,000	.060	1.4	.105	2.6				
Current Resident in Excess 1,000,000	.211	3.6	.297	5.2				
College Quality (Gourman Rating)								

Independent Variables	coef	t value	coef	t value	coef	t value	coef	t value
eight 1969 (100's of lbs.)	1.114	1.4*	1.684	2.2	1.083	1.3*	1.509	1.9*
eight Squared, 1969	-.288	1.3*	-.430	2.0	-.271	1.2*	.376	1.7*
ummy for Non Response in 1972	.040	.4*	.156	1.6	-.055	.6*	.009	.1*
ntered School Age 7+	-.074	.8*	-.116	1.3*	-.077	.8*	-.108	1.2*
55			-.089	19.1			-.067	14.4
onstant	-.424	.5*	-.494	.6*	.344	.4*	.332	.4*
R^2	.135		.200		.084		.124	
tand Error	1.109		1.067		1.142		1.117	
egrees of Freedom	4547		4546		4555		4554	

* Not significant at the 5% level.

Appendix B

WORK EXPERIENCE, EARNINGS, AND INCOME

1. We would like you to describe your work experience below, starting with your present job. An illustrative set of responses have been included in dark type.

For the earnings information, even very rough estimates will be helpful. If you are self-employed, mark column 1 as self-employed and interpret the salary columns as total income. If you have more than one job, please report salary on main job only.

Card II

	Position Held	Years Worked	Beginning Salary (Annual full time)	Ending Salary (Annual full time)	Pension Plan (X if yes)	Average Weekly Hours During Last Year: Main Job	Other Jobs
	Foreman	1961-68	Survey of Post-War Education and Employment			42	4
PRESENT JOB					☐		
PREVIOUS JOBS					☐		
					☐		
					☐		
					☐		
					☐		
FIRST JOB (Full-time, after finishing school)					☐		

Office Use: 8-10, 11-15, 16-17, 18-19, 20-21, 22-1

1. Name
2. Present Address
3. (a) What schooling have you had since your first separation from the Armed Forces? If none, check here ☐

	Place	Major Subject	Dates Attended From	To	Degree, Certificate or Diploma Earned
Example:	University of Maryland:	Mathematics	Sept. 1946	June 1950	B. A.

(b) Have you had any on-the-job training since you were separated from the Armed Forces? Yes ☐ No ☐ If yes, what kind?

(c) If your schooling or on-the-job training was taken under the GI Bill, under what public law did you receive education benefits?

PL 16 (for disabled veterans) ☐ PL 346 (other veterans) ☐

4. What jobs have you had since your separation from the Armed Forces? (Please list your present job first, the one before that next, etc.)

	Title of Job	Starting Date	Ending Date	Kind of Business	Last Monthly Salary (Annual full time)
Example:					
a.	Welder	Feb. 1949	Present	Aircraft Factory	$390
b.	Sheet Metal Worker	June 1947	Feb. 1949	Automobile Factory	$370
2.					
3.					
4.					
5.					

5. (a) Describe what you do in your present job.

Business Proprietor (owner) ☐ 6-1
Check X if farm operator
Managerial (executive, office manager, etc.) ☐ -2
Professional (Doctor, lawyer, accountant, teacher, etc.)
Self-employed ☐ -3
Salaried ☐ -4
Check X if teacher
Technical, (draftsman, surveyor, medical, etc.) ☐ -5
Office worker ☐ -6
Salesman ☐ -7
Service worker ☐ -8
Protective (policeman, etc.) ☐
Retail or wholesale trade ☐
Other ☐
"Blue-collar" employee
Foreman or supervisor ☐ 7-1
Skilled ☐ -2
Semi-skilled ☐ -3
Unskilled ☐ -4
Other (please specify) ☐ -5
Don't know ☐ -6
Not applicable ☐ -7

(b) How many employees do you supervise? ☐ 12-1 ☐ 13-1 ☐ 14-1

(c) How well do you think you are performing in your present work? (Check one box)
Barely Satisfactory ☐ About as well as average ☐ Better than average ☐ Successful ☐

(d) How well do you like the type of work you are now doing? (Check one box)
Dislike ☐ O.K. It's a job ☐ Like it ☐ Better than most ☐

6. Do you have a license or have you passed a certifying examination of any kind? (Example—Master Plumber License, CPA, Licensed Electrician, Teacher, etc.) Yes ☐ No ☐ If yes, what

(a) Did you enter the Armed Forces directly from high school? Yes ☐ No ☐ If not, what did you do between high school and your first entry into the Armed Forces? (Do not count short tours of duty for reserve training.)

(b) Did you enter any regular or extended active duty (1 year or more) after your first separation from the Armed Forces? (Do not count short tours of duty for reserve training.) Yes ☐ No ☐ If yes, please give dates.

	A Month	A Year	B Month	B Year	C Month	C Year
From						
to						
From						
to						

(c) Did you ever receive educational counseling through the Veterans Administration? Yes ☐ No ☐

9. Please give your Social Security number if it is readily available.

(Use the other side of the blank for any comments that you think will give us a better picture of your post-World War II career.)

2. For the past year, please indicate the number of weeks you and your wife's father (C) during most of their working spent doing each of the following:

Card III

Number of Weeks

Card IV

	A Your Own Job	B Father's Job	C Wife's Father's Job
Full-time work (or both full and part-time) 6-7			
Part-time work 8-9			
Paid vacation 10-11	☐ 6-1	☐ 8-1	☐ 10-1
Out of work or on layoff 12-13 Check ☐ if seasonal			
Unable to work due to illness 14-1			
Other (please specify) 15-16	☐ -2	☐ -2	☐ -2
Total 17-18 52	☐ -3	☐ -3	☐ -3
	☐ -4	☐ -4	☐ -4

3. Please indicate your total household income for the following years. If your income was unusually high or low in these years, please indicate the average for surrounding years (e.g. 1967-68-69).

YEAR	YOUR TOTAL EARNINGS	TOTAL EARNINGS OF OTHER HOUSEHOLD MEMBERS	OTHER INCOME (dividends, capital gains, etc.)	TOTAL FAMILY INCOME
1968	$	$	$	$
1958	$	$	$	$
		19-40		
		41-62		

OCCUPATIONAL INFORMATION

A number of job descriptions are listed below. Please indicate X which of these best describes your own job (A), and which best describes the type of job held by your father (B),

JOB DESCRIPTION

Questionnaire sent to a (biased) survey sample by Ulrund Ike and Hagen

A TWENTY-FIVE YEAR FOLLOW-UP SURVEY

Sponsored by the National Bureau of Economic Research, New York, New York

We plan to begin tabulations by July 1, and would appreciate your returning the questionnaire as soon as possible.

Identification

Disregard the small numbers to the right of the boxes; they are for tabulation purposes.

GENERAL INFORMATION

1. What is your age (last birthday)? ..... years. 6- 7

2. Please check X below to indicate your marital status.

Single	☐	8- 1	Date
Married	☐	- 2	..... 19 8-10
Divorced	☐	- 3	
Widower	☐	- 4	
Other	☐	- 5	

3. How many children do you have?

None	☐	11-1	4	☐	-5
1	☐	-2	5	☐	-6
2	☐	-3	6 or more	☐	-7
3	☐	-4			

4. Do you own your own home or co-operative apartment?

Yes—house	☐	12-1
Yes—apartment	☐	-2
No	☐	-3

5. What is the state of your general health?

Excellent	☐	33-1
Good	☐	-2
Fair	☐	-3
Poor	☐	-4

6. What is your approximate height?
..... ft. ..... inches 35-61

7. What is your approximate weight?
..... lbs. 62-64

EDUCATIONAL BACKGROUND

1. Please fill in the following form. We have included an illustrative set of responses in dark type.

SCHOOLS ATTENDED	DATES ATTENDED	GRADUATED (X if yes)	TYPE OF DEGREE RECEIVED	DATE DEGREE RECEIVED
HIGH SCHOOL				
Locust Valley, Pennsylvania	**1938-42**	**X**		
.....	.....			
.....	 17-18	☐ 15- 1		
VOCATIONAL TRAINING				
Automotive Repair School	**1946**	**X**		
.....	.....	☐ 20- 1		
UNDERGRADUATE COLLEGE OR UNIVERSITY				
U. of Colorado, Boulder	**1943, 45-48**	**X**	**B.A.**	**1948**
.....	.....			
.....	.....	☐ 21- 1	..... 22- 1	 23-24
			- 2	
GRADUATE SCHOOL				
.....	.....	☐	.....	.....
.....	.....	☐ 25- 1	.....	 26-27

2. Please indicate the highest grade of schooling completed by each of the following family members: (High school graduate would be 12, college graduate 16, etc.):

	Highest Grade Completed	
Wife	..... yrs.	61-62
Your father	..... yrs.	63-64
Wife's father	..... yrs.	65-66

3. Based on your own personal experience, what do you think high schools and colleges should concentrate on? Indicate your choice by circling the appropriate number on the scale from 5 (very great importance) to 1 (very little importance).

	Great importance ←				Little importance →	
Basic skills (reading, mathematics, etc.)	5	4	3	2	1	67
General knowledge (history, literature, science, etc.)	5	4	3	2	1	68
Career preparation (vocational, professional, etc.)	5	4	3	2	1	69
Activities (school clubs, newspapers, sports, etc.)	5	4	3	2	1	70
Social awareness (current social problems, community action, etc.)	5	4	3	2	1	71

WORK EXPERIENCE, EARNINGS, AND INCOME

1. We would like you to describe your work experience below, starting with your present job. An illustrative set of responses have been included in dark type.

For the earnings information, even very rough estimates will be helpful. If you are self-employed, mark column 1 as self-employed and interpret the salary columns as total income. If you have more than one job, please report salary on main job only.

Card II

	Position Held	Years Worked	Beginning Salary (Annual full time)	Ending Salary (Annual full time)	Pension Plan (X if yes)	Average Weekly Hours During Last Year: Main Job	Average Weekly Hours During Last Year: Other Jobs
	Foreman	1961-66	$7,500	$8,600	X	42	4
PRESENT JOB	.....	.....	.....	.....	☐	.....	.....
PREVIOUS JOBS	.....	.....	.....	.....	☐		
	.....	.....	.....	.....	☐		
	.....	.....	.....	.....	☐		
	.....	.....	.....	.....	☐		
	.....	.....	.....	.....	☐		
	.....	.....	.....	.....	☐		
	.....	.....	.....	.....	☐		
FIRST JOB (Full-time, after finishing school)	.....	.....	.....	.....	☐		

Office Use

.....	6-10
.....	11-15
.....	16-17
.....	18-19
.....	20-21
.....	22-1

2. For the past year, please indicate the number of weeks spent doing each of the following:

Card III

	Number of Weeks	
Full-time work (or both full and part-time)	.....	6-7
Part-time work	.....	8-9
Paid vacation	.....	10-11
Out of work or on layoff	.....	12-13
Check ☐ if seasonal		14-1
Unable to work due to illness	.....	15-16
Other (please specify)	.....	17-18
Total	52	

3. Please indicate your total household income for the following years. If your income was unusually high or low in these years, please indicate the average for surrounding years (e.g. 1967-68-69).

YEAR	YOUR TOTAL EARNINGS	TOTAL EARNINGS OF OTHER HOUSEHOLD MEMBERS	OTHER INCOME (dividends, capital gains, etc.)	TOTAL FAMILY INCOME
1968	$.....	$.....	$.....	$.....
1958	$.....	$.....	$.....	$.....
		19-40		
		41-62		

OCCUPATIONAL INFORMATION

A number of job descriptions are listed below. Please indicate X which of these best describes your own job (A), and which best describes the type of job held by your father (B), and your wife's father (C) during most of their working lives.

Card IV

JOB DESCRIPTION	A Your Own Job	B Father's Job	C Wife's Father's Job
Business Proprietor (owner)	☐ 6-1	☐ 8-1	☐ 10-1
Check X if farm operator A ☐ 12-1 B ☐ 13-1 C ☐ 14-1			
Managerial (executive, office manager, etc.)	☐ -2	☐ -2	☐ -2
Professional (Doctor, lawyer, accountant, teacher, etc.)			
Self-employed	☐ -3	☐ -3	☐ -3
Salaried	☐ -4	☐ -4	☐ -4
Check X if teacher A ☐ 15-1 B ☐ 16-1 C ☐ 17-1			
Technical, (draftsman, surveyor, medical, etc.)	☐ -5	☐ -5	☐ -5
Office worker	☐ -6	☐ -6	☐ -6
Salesman	☐ -7	☐ -7	☐ -7
Service worker	☐ -8	☐ -8	☐ -8
Protective (policeman, etc.)	☐	☐	☐
Retail or wholesale trade	☐	☐	☐
Other	☐	☐	☐
"Blue-collar" employee			
Foreman or supervisor	☐ 7-1	☐ 9-1	☐ 11-1
Skilled	☐ -2	☐ -2	☐ -2
Semi-skilled	☐ -3	☐ -3	☐ -3
Unskilled	☐ -4	☐ -4	☐ -4
Other (please specify)	☐ -5	☐ -5	☐ -5
Don't know	☐ -6	☐ -6	☐ -6
Not applicable	☐ -7	☐ -7	☐ -7

ATTITUDE TOWARD JOB

In this section we want to find out how people feel about their work. Just circle the number that best describes your own evaluation. The numbers constitute a scale ranging from five (highest, best, etc.) to one (lowest, worst, etc.)

	High ←				→ Low	
Do you enjoy your work?	5	4	3	2	1	18
Does your work provide a challenge?	5	4	3	2	1	19
Is your work interesting?	5	4	3	2	1	20

For the items listed below, how does your total work experience to date compare with what you expected when you first started? (3 = about as expected)

Financial compensation	5	4	3	2	1	21
Requirement for independent judgment	5	4	3	2	1	22
Responsibility	5	4	3	2	1	23
Prospects for advancement	5	4	3	2	1	24

Below is a list of possible requirements for achieving success in a particular job or profession. Indicate on the scale where your own type of work should be ranked. That is, to what degree does success in your work depend on: (3 = average importance for success)

Your own performance	5	4	3	2	1	25
Having the right connections	5	4	3	2	1	26
Being able to get along with people	5	4	3	2	1	27
Being lucky or unlucky	5	4	3	2	1	28
Having a college diploma	5	4	3	2	1	29
Working hard	5	4	3	2	1	30

ACTIVITIES

In this section we would like you to indicate X the extent of your participation in social, civic, religious, and other similar activities.

1. Which of the following types of groups, if any, do you devote some amount of time to, either as a member, an active participant, or an officer.

	Type of Participation (X) Membership	Active Participant	Leadership	No. of Hours During Last Month	
Service organizations (Rotary, Chamber of Commerce, etc.)	☐ 31-1	☐ -2	☐ -3		32-33
Youth organizations (scouting, Little League, etc.)	☐ 34-1	☐ -2	☐ -3		35-36
Veterans' organizations	☐ 37-1	☐ -2	☐ -3		38-39
Professional and trade associations	☐ 40-1	☐ -2	☐ -3		41-42
Political organizations	☐ 43-1	☐ -2	☐ -3		44-45
Educational organizations (PTA, etc.)	☐ 46-1	☐ -2	☐ -4		47-48
Church or church related organizations					
Religious activity	☐ 49-1	☐ -2	☐ -3		50-51
Educational activity	☐ 52-1	☐ -2	☐ -3		53-54
Social action	☐ 55-1	☐ -2	☐ -3		56-57
Community and social action groups	☐ 58-1	☐ -2	☐ -3		59-60
Organized volunteer work (hospital, etc.)	☐ 61-1	☐ -2	☐ -3		62-63
Fund raising	☐ 64-1	☐ -2	☐ -3		65-66
Personal service	☐ 67-1	☐ -2	☐ -3		68-69
Informal helping out—friends, neighbors, or relatives		☐ 70-2			71-72
Household tasks		☐ 73-2			74-75

2. Please check X below to indicate your religious preference.

Card V

Protestant	☐	50-1
Catholic	☐	-2
Jewish	☐	-3
Other	☐	-4
None	☐	-5

3. Please indicate X which of the following best describes your voting habits:

Always vote in local, state, and national elections	☐	51-1
Always vote in national elections, sometimes in state and local ones	☐	-2
Usually vote in national elections	☐	-3
Sometimes vote in national elections	☐	-4
Seldom vote in any elections	☐	-5

4. Do you think of yourself as politically conservative or liberal?

Very conservative	☐	52-1
Moderately conservative	☐	-2
Sometimes conservative, sometimes liberal	☐	-3
Moderately liberal	☐	-4
Very liberal	☐	-5

SOCIAL, ECONOMIC, AND POLITICAL ATTITUDES

In this section we would like you to indicate your attitude about various social and economic problems. Please check X the appropriate box, and feel free to add additional explanation where necessary.

1. Do you feel that young people today have too much freedom, too little, or about the right amount?

Too much ... ☐ 53-3 About right ... ☐ 53-2 Too little ... ☐ 53-1

2. Do you feel that people today are too much concerned with financial security, too little, or what?

Too much ... ☐ 54-3 About right ... ☐ 54-2 Too little ... ☐ 54-1

3. During the past ten years or so, do you think that the pace of racial integration has been too fast, too slow, or about right—considering the welfare of the country as a whole?

Too fast ... ☐ 55-3 About right ... ☐ 55-2 Too slow ... ☐ 55-1

4. Assuming you thought that the financial possibilities were about the same, would you prefer to work for yourself or for somebody else?

Prefer self-employment	☐	56-3
No preference	☐	-2
Prefer salaried employment	☐	-1

5. Suppose you thought that the financial advantages were, on the average, slightly favorable if you worked for yourself rather than for someone else. Would you then prefer:

Self-employment	☐	57-3
No preference	☐	-2
Salaried employment	☐	-1

ASSETS, DEBTS, SAVINGS, AND PURCHASES—OPTIONAL

The following questions are of considerable interest to us, but we know that some people regard financial information of this sort as very personal. If that is your feeling, just skip this section. Please return the form, since the other information will be of great help in the study. Once again, let us note that all replies will be treated with the strictest confidence.

1. Please check X to indicate the approximate amount of your household's assets or debts in each of the following categories:

Card V

	APPROXIMATE AMOUNT (dollars)									
	DON'T HAVE	Under $1,000	$1,000-2,000	$2,000-5,000	$5,000-10,000	$10,000-20,000	$20,000-40,000	$40,000-80,000	Over $80,000	
Checking accounts	☐ 6-1	☐ -2	☐ -3	☐ -4	☐ -5	☐ -6	☐ -7	☐ -8	☐ -9	
Savings accounts and government savings bonds	☐ 7-1	☐ -2	☐ -3	☐ -4	☐ -5	☐ -6	☐ -7	☐ -8	☐ -9	
Common stock, mutual funds, other marketable securities (current market value)	☐ 8-1	☐ -2	☐ -3	☐ -4	☐ -5	☐ -6	☐ -7	☐ -8	☐ -9	
Value of your home (what it would currently sell for)	☐ 10-1	☐ -2	☐ -3	☐ -4	☐ -5	☐ -6	☐ -7	☐ -8	☐ -9	
Equity in annuities and life insurance (cash surrender value)	☐ 11-1	☐ -2	☐ -3	☐ -4	☐ -5	☐ -6	☐ -7	☐ -8	☐ -9	
Equity in pension plan (other than Social Security)	☐ 12-1	☐ -2	☐ -3	☐ -4	☐ -5	☐ -6	☐ -7	☐ -8	☐ -9	
Other assets (own business, real estate)	☐ 13-1	☐ -2	☐ -3	☐ -4	☐ -5	☐ -6	☐ -7	☐ -8	☐ -9	
Mortgage on your home	☐ 14-1	☐ -2	☐ -3	☐ -4	☐ -5	☐ -6	☐ -7	☐ -8	☐ -9	
Other personal debt (installment, etc.)	☐ 15-1	☐ -2	☐ -3	☐ -4	☐ -5	☐ -6	☐ -7	☐ -8	☐ -9	

2. Please indicate the approximate **change** (either increase or decrease) over the past 12 months in each of the following:

	← Amount of DECREASE				No Change	Amount of INCREASE →			
	Over $2,000	$1,000-2,000	$500-1,000	Under $500		Under $500	$500-1,000	$1,000-2,000	Over $2,000
Checking and savings accounts, government bonds	☐ 16-1	☐ -2	☐ -3	☐ -4	☐ -5	☐ -6	☐ -7	☐ -8	☐ -9
Common stock, mutual funds, other marketable securities (count only net new money put in or taken out)	☐ 17-1	☐ -2	☐ -3	☐ -4	☐ -5	☐ -6	☐ -7	☐ -8	☐ -9
Equity in annuities and life insurance (cash surrender value)	☐ 19-1	☐ -2	☐ -3	☐ -4	☐ -5	☐ -6	☐ -7	☐ -8	☐ -9
Equity in a pension plan (other than Social Security)	☐ 20-1	☐ -2	☐ -3	☐ -4	☐ -5	☐ -6	☐ -7	☐ -8	☐ -9
Other assets (count only net purchases or sales)	☐ 21-1	☐ -2	☐ -3	☐ -4	☐ -5	☐ -6	☐ -7	☐ -8	☐ -9
Mortgage balance outstanding	☐ 22-1	☐ -2	☐ -3	☐ -4	☐ -5	☐ -6	☐ -7	☐ -8	☐ -9
Installment and other debts outstanding	☐ 23-1	☐ -2	☐ -3	☐ -4	☐ -5	☐ -6	☐ -7	☐ -8	☐ -9

3. During the past 12 months, have you

	Yes	No	If yes, Approximate Cost	
Purchased a home	☐ 24-1	☐ -2	$.....	25-29
Purchased a car	☐ 30-1	☐ -2	$.....	31-35
Purchased major durables, appliances, or furniture	☐ 36-1	☐ -2	$.....	37-41
Made major alterations or repairs on your home	☐ 42-1	☐ -2	$.....	43-47

Thank you very much for your cooperation in filling out this questionnaire. If you would like to receive a summary of the results when the study is completed, indicate by X.

☐ Would like summary

SUPPLEMENTAL QUESTIONNAIRE: TWENTY-FIVE YEAR FOLLOW-UP SURVEY

We would like you to answer the following few questions, which represent items of information that will be helpful to us in interpreting some of the data from the original questionnaire. Please use the return envelope provided for your convenience. Thank you.

06593

Identification

PLEASE MARK ☒ IN THE APPROPRIATE BOX: The numbers at the right are for tabulation purposes.

Q. 1: Are you working at the same job as last year?

- ☐ 6-1 Yes - same job
- ☐ 6-2 No - have changed job

Q. 2: Have you ever owned and operated a full-time business (do not include medical or law practice, etc.)?

- ☐ 7-1 Yes - own and operate business at present (please write in type of business) _____
- ☐ 7-2 Yes - have owned and operated business in past, but no longer doing so

If answer is Yes please go to 2A:

- ☐ 7-3 No - have never owned or operated business

Q. 2A: Did you receive any help from a Veterans Administration loan when you got started in this business?

- ☐ 8-1 Yes
- ☐ 8-2 No

Q. 3: How would you describe the town in which you grew up?

- ☐ 9-1 Rural area
- ☐ 9-2 Small town (under 10,000)
- ☐ 9-3 Moderate sized city (between 10,000 and 50,000)
- ☐ 9-4 Large city (between 50,000 and 500,000)
- ☐ 9-5 Metropolitan center (over 500,000)

Q. 4: How would you describe your high school record?

- ☐ 10-1 Very high grades
- ☐ 10-2 High grades
- ☐ 10-3 Average grades
- ☐ 10-4 Poor grades

Q. 5: Was your high school work mainly concentrated on:

- ☐ 11-1 Academic-type courses (college preparation)
- ☐ 11-2 Vocational-type courses (work preparation)

Q. 6: In the high school that you attended, were most of the other students:

- ☐ 12-1 Financially better off than you
- ☐ 12-2 Financially about the same as you
- ☐ 12-3 Financially worse off than you

Q. 7: Please indicate below how many brothers and sisters you have (including those no longer living)

Older brothers and sisters	Younger brothers and sisters
☐ 13-1 None	☐ 14-1 None
☐ 13-2 1	☐ 14-2 1
☐ 13-3 2	☐ 14-3 2
☐ 13-4 3	☐ 14-4 3
☐ 13-5 4 or more	☐ 14-5 4 or more

Q. 8: [FOR THOSE WHO ATTENDED COLLEGE.]

Do you think you would have gone to college if there had not been a "GI Bill" which took care of most expenses?

- ☐ 15-1 Yes - would have gone anyway
- ☐ 15-2 Probably would have gone anyway
- ☐ 15-3 No - couldn't have gone without GI Bill
- ☐ 15-4 Don't know

A SUPPLEMENT TO
THE TWENTY-FIVE YEAR FOLLOW-UP SURVEY

Sponsored by the National Bureau of Economic Research, New York, New York

We plan to begin tabulations in 10 DAYS, and would appreciate your returning the questionnaire as soon as possible.

IDENTIFICATION

001708

Disregard the small numbers to the right of the boxes; they are for tabulation purposes.

FAMILY BACKGROUND AND EARLY CHILDHOOD INFORMATION

1. While you were growing up and going to school, what type of house did you and your family live in?

Single-family house that we owned	☐	6-1
Single-family house that we rented	☐	-2
Apartment	☐	-3
Other	☐	-4

2. Did you share a room with other children or have a room to yourself while you were growing up?

Shared room	☐	7-1
Had own room	☐	-2
Both, at different times	☐	-3

3. Up to graduation from high school, about how many times did you and your family move?

Never moved—stayed in same house	☐	8-1
Moved once or twice	☐	-2
Moved three or four times	☐	-3
Moved five times or more	☐	-4

4. (For those who moved at least once.) Were all of these moves within the same neighborhood or town?

Yes—within same neighborhood	☐	9-1
Yes—within same city or town	☐	-2
No—moved to different city or town	☐	-3
No—moved from farm to city or town	☐	-4

5. At what age did you start going to school?

Under five years old (nursery school or kindergarten)	☐	10-1
Five years old (kindergarten or first grade)	☐	10-2
Six years old	☐	10-3
Seven years old	☐	10-4
Eight or older	☐	10-5

6. What kind of elementary (grammar) school and high school did you attend? (If more than one, check all schools attended and circle the one from which you graduated.)

Type of School	Elementary School		High School	
Public school	☐	11-1	☐	12-1
Parochial (religious) school	☐	-2	☐	-2
Private (tuition-paying) school	☐	-3	☐	-3

7. Before you started school and while you were in elementary school, did your mother have a regular job of any kind?

Mother's Work Status	Your Age and School Status: Age 0-5 (Pre-school)		Age 6-14 (Elementary School)	
Worked full time each year	☐	13-1	☐	14-1
Worked full time some years	☐	-2	☐	-2
Worked part time each year	☐	-3	☐	-3
Worked part time some years	☐	-4	☐	-4
Did not work	☐	-5	☐	-5
Don't recall	☐	-6	☐	-6

8. How many years of formal schooling did your mother receive?

0-4 years	☐	15-1
5-6 years	☐	-2
7-8 years	☐	-3
9-10 years	☐	-4
10-11 years	☐	-5
12 years (finished high school)	☐	-6
13-15 years (some college training)	☐	-7
16 or more years (college graduate)	☐	-8
Don't know	☐	-9

9. Aside from your regular school, did you also attend religious instruction or other church-related schools or classes?

Yes—several times a week	☐	16-1
Yes—weekly	☐	-2
Yes—occasionally	☐	-3
No	☐	-4

10. Please rank the following activities, indicating how you were most likely to spend free time while you were growing up? Indicate your choice by circling the appropriate number on the scale from 5 (most often) to 1 (hardly ever)

Type of Activity	Most Often ←				Hardly Ever →	
Sports	5	4	3	2	1	17
Hobbies	5	4	3	2	1	18
Reading	5	4	3	2	1	19
Chores around home	5	4	3	2	1	20
Part-time job	5	4	3	2	1	21
Other (please specify)	5	4	3	2	1	22

11. (Answer only if married.) How many years of formal schooling did your wife's mother receive?

0-4 years	☐	23-1
5-6 years	☐	-2
7-8 years	☐	-3
9-10 years	☐	-4
10-11 years	☐	-5
12 years (finished high school)	☐	-6
13-15 years (some college training)	☐	-7
16 or more years (college graduate)	☐	-8
Don't know	☐	-9

INFORMATION ON WIFE AND CHILDREN

Please answer Questions 1 through 5 only if married.

1. Approximately how long have you been married?

..... years — 24, 25

2. What is the approximate age of your wife at the present time?

..... years — 26, 27

3. What type of school did your wife attend when she was growing up?

Type of School	Elementary School	High School
Public school	☐ 28-1	☐ 29-1
Parochial (religious) school	☐ -2	☐ -2
Private (tuition-paying) school	☐ -3	☐ -3

4. Since your marriage, has your wife ever had a regular full- or part-time job?

Yes	☐ 30-1	Please answer Question 5
No	☐ -2	Please skip to Question 6

5. Please check the appropriate boxes to show your wife's employment history from the time of your marriage. Note that many people have different answers depending on number of years after marriage; for example, many wives do not work during their first five years of marriage but work part time later on, etc.

Years After Marriage	Wife Did Not Work	Wife Worked Part Time	Wife Worked Full Time	(If Worked, Type of Job)
1-4	☐ -1	☐ -1	☐ -1	..... 31, 32, 33
5-9	☐ -2	☐ -2	☐ -2	.....
10-14	☐ -3	☐ -3	☐ -3	.....
15 or more	☐ -4	☐ -4	☐ -4	.....

Please answer Questions 6 and 7 only if you have one or more children.

6. Indicate the ages and the current school status of your children, including children on longer living with you. In the last column, indicate how many years of schooling you eventually expect each child to complete.

School Status of Each Child
N = Nursery School
K = Kindergarten
1 = First Grade
16 = College Graduate

Children	Age	Sex (M or F)	Type of School Now Attending: Public	Parochial	Private	Not in School	Present Grade	Grade Expected to Complete (or Completed)
Oldest	.....	.....	☐ 34-1	☐ -2	☐ -3	☐ -4	.....	.....
.....	.....	.....	☐ 35-1	☐ -2	☐ -3	☐ -4	.....	.....
.....	.....	.....	☐ 36-1	☐ -2	☐ -3	☐ -4	.....	.....
.....	.....	.....	☐ 37-1	☐ -2	☐ -3	☐ -4	.....	.....
.....	.....	.....	☐ 38-1	☐ -2	☐ -3	☐ -4	.....	.....
.....	.....	.....	☐ 39-1	☐ -2	☐ -3	☐ -4	.....	.....
.....	.....	.....	☐ 40-1	☐ -2	☐ -3	☐ -4	.....	.....
Youngest	.....	.....	☐ 41-1	☐ -2	☐ -3	☐ -4	.....	.....

7. Have any of your children attended nursery school or other pre-kindergarten school?

All attended	☐ 42-1
Some attended	☐ -2
None attended	☐ -3

17. Friedman, M. "Choice, Chance and the Personal Distribution of Income", J.P.E., Aug. 1953. pp. 277-90.

18. Griliches, Z. and W. Mason, "Education, [illegible] May June, 1972.

19. Hanemann, L. & P. West. They Went to College: The College Graduate in America Today, N.Y.: Harcourt, Brace, 1952.

20. Hunt, S.J. "Income Determinants for College Graduates and the Return to Educational Investment", Unpublished Ph.D. Dissertation, Yale U. 1963.

21. Jencks, J. & D.M. Kelker, "Comparison [illegible] Mathematical, Mathematical and Classical Approaches to the Analysis of Human Services" Psychological Bulletin, May 1970, Vol. 73, No. [illegible]

22. Kagan, J. & S. Tulkin. "Social Class Differences in Child Rearing during the First Year" in The Origins of Human [illegible] Schaffer, Academic Press, 1971.

23. [illegible] Economic" Economic Journal, Vol. L, 1940, p. 78-92.

24. Kendall, M.G. and A. Stuart, The Advanced Theory of Statistics, Griffin, London, 1961.

25. [illegible] Aged Men" Center for Human Resources Research, Ohio State, 1972.

26. Kravis, I. "Relative Income Shares in Fact and Theory", American Economic Review, [illegible] 1959.

27. Kravis, I. The Structure of Income. Some Quantitative Essays. Phila., 19[illegible] .....

28. Lebergott, S. "The Shape of the Income Distribution" Amer. Econ. Review [illegible]

29. Little, J. A State-Wide Inquiry into Decisions of Youth About Education beyond High School, Univ. of Wisconsin, Madison, 1958.

30. Lydall, H. The Structure of Earnings, Oxford: Clarendon Press, 1968.

31. Mandelbrot, B. "Paretian Distributions and [illegible] Journal of Economics, Feb. 19[illegible] pp. 57-85.

32. Merton, R. Social Theory and Social Structure

HEALTH HISTORY

1. What is the state of your general health at present?

Excellent	☐	43-1
Good	☐	-2
Fair	☐	-3
Poor	☐	-4

2. During the years you were attending high school what was the state of your health?

Excellent	☐	44-1
Good	☐	-2
Fair	☐	-3
Poor	☐	-4
Don't recall	☐	-5

3. During the time you were attending high school, how many weeks per year did you lose from school, on the average, due to your own illness or injury? (Exclude injuries from athletics.)

None	☐	45-1
Less than a week	☐	-2
1-2 weeks	☐	-3
More than two weeks	☐	-4
Don't recall	☐	-5

4. Since you began working, have you ever lost any time from work because of your own illness?

Yes	☐	46-1
No	☐	-2

5. (If yes on 4.) Approximately how much total time (in terms of weeks) have you lost through illness during your working lifetime?

..... weeks 47, 48

6. Since you left military service after World War II, have you ever been unemployed?

Yes	☐	49-1
No	☐	-2

(If no, skip to General Information.)

7. (If yes on 6.) Approximately how much total time have you lost because of unemployment since you left the service?

..... weeks 50, 51

8. On how many different occasions have you been unemployed?

Once	☐
Twice	☐
Three or more times	☐

GENERAL INFORMATION

1. What was your rank when you left active military service after the Second World War?

.....

2. At what age do you expect to retire?

At age 52, 53

3. Between now and the time you plan to retire, do you expect your earnings to:

Increase substantially	☐	54-1
Increase somewhat	☐	-2
Stay about the same	☐	-3
Decrease somewhat	☐	-4
Decrease substantially	☐	-5

4. Over the last several years, have the average number of hours you work each week:

Increased substantially	☐	55-1
Increased moderately	☐	-2
Stayed about the same	☐	-3
Decreased moderately	☐	-4
Decreased substantially	☐	-5

5. What are the major reasons for any change in the number of hours you have worked in recent years? (Please write in.)

6. What is the approximate size of the town or city where you now live?

Rural area (under 2,500 people)	☐	56-1
Small town (2,500-10,000)	☐	-2
Town (10,000-50,000)	☐	-3
Moderately sized city (50,000-250,000)	☐	-4
Large city (250,000-1 million)	☐	-5
Major metropolitan area (over 1 million)	☐	-6

OCCUPATIONAL HISTORY

1. What is your occupation at the present time?

.....

2. We are interested in the kind of jobs people take when they first begin working, especially for those who leave school before finishing in order to begin work. Please indicate, by checking Yes or No, whether any of the following circumstances were present when you began working full time.

When you began work:	Yes	No
Were you married?	☐ 57-1	☐ -2
Did you have children?	☐ 58-1	☐ -2
Did you receive an exceptional job offer?	☐ 59-1	☐ -2
Were you self-employed?	☐ 60-1	☐ -2
Was there financial pressure to work?	☐ 61-1	☐ -2
Did you spend much time looking for a job?	☐ 62-1	☐ -2
Did you regret having to leave school?	☐ 63-1	☐ -2
Did you have any specific vocational training for the job?	☐ 64-1	☐ -2

3. As best you can remember, what factors influenced your decision to enter the occupational field you are in at the present time? Check yes or no to each of the following and indicate factors that were of special importance.

Factors that influenced decision to enter present occupation:

	Yes	No	Of Special Importance
Type of training in school	☐ 6-1	☐ -2	☐ 7-1
Type of training in military	☐ 8-1	☐ -2	☐ 9-1
Personal contacts (friends or relatives)	☐ 10-1	☐ -2	☐ 11-1
Salary or pay offered	☐ 12-1	☐ -2	☐ 13-1
Prospects of eventual financial success	☐ 14-1	☐ -2	☐ 15-1
Chance to do interesting work	☐ 16-1	☐ -2	☐ 17-1
Chance for independent work	☐ 18-1	☐ -2	☐ 19-1
Chance for a lot of person-to-person contact	☐ 20-1	☐ -2	☐ 21-1
Chance to help others	☐ 22-1	☐ -2	☐ 23-1
Represented a challenge	☐ 24-1	☐ -2	☐ 25-1
Job security	☐ 26-1	☐ -2	☐ 27-1
Provided a lot of free time	☐ 28-1	☐ -2	☐ 29-1
Always liked that kind of work	☐ 30-1	☐ -2	☐ 31-1

Please check below if you wish to receive a summary of the results from this questionnaire.

I would like to receive the summary of results .... ☐

Use this space for additional explanation where needed.

BIBLIOGRAPHY

1. Aitchison, J. & Brown. The Lognormal Distribution. Cambridge University Press, 1957.

2. Arrow, K. and R. Lind. "Uncertainty and Evaluation of Public Investment Decisions", American Economic Review, June 1970.

3. Atkinson, A.B. "On the Measurement of Inequality", J. Econ. Theory, 2, #3, September 1970.

4. Becker, G. Human Capital, Columbia University Press, 1964.

5. Becker, G. "Human Capital and the Personal Distribution of Income: An Analytical Approach" Woytinsky Lecture No. 1, University of Michigan, Ann Arbor, 1967.

6. Blau, P. & O.D. Duncan, The American Occupational Structure, New York: John Wiley & Sons, Inc. 1967.

7. Bloom, B.S. Stability and Change in Human Characteristics , John Wiley & Sons, Inc. 1964 N.Y.

8. Burt, C. "Quantitative Genetics in Psychology" The British Journal of Mathematical and Statistical Psychology, Vol. 24, Part 1, May 1971.

9. Cavalli-Sforza, L.L. & W.F. Bodmer, The Genetics of Human Population, San Francisco: W. H. Freeman & Co., 1971.

10. Champernowe, D.G. "A Model of Income Distribution" Econ. J., 1953.

11. Christensen, L. "Tax Policy and Investment Expenditures in a Model of General Equilibrium" 1969 A.E.R. meetings

12. Clark, B.,Heist, P, McConnell,T. et al. Students and Colleges: Interaction and Change. Center for Research and Development in Higher Education, Univ. of Calif. at Berkeley, 1972.

13. Crockett, J. "Technical Note" in Consumption and Savings, Vol. II, U. of P. Press, ed. by Friend & Jones, 1960.

14. Eckland, B. "Academic Ability, Higher Education and Occupational Mobility" American Sociological Review, Oct. 1965.

15. Featherman, D. "The Socioeconomic Achievement of White Religio-Ethnic Subgroups: Social and Psychological Explanations" American Sociological Review, 1971, Vol. 36 (Apr): 207-222.

16. Friedman, M. A Theory of the Consumption Function, Princeton U. Press, 1957.

51. Wise, D. Academic Achievement and Job Performance: Earnings and Promotions, Doctoral Dissertation, Berkeley, Calif. Univ. of .

17. Friedman, M. "Choice, Chance and the Personal Distribution of Income", J.P.E., Aug. 1953. pp. 277-90.

18. Griliches, Z. and W. Mason, "Education, Income and Ability", J.P.E., May-June, 1972.

52. Wolfe, B. "A Socioeconomic Analysis of Family Building Behavior" Unpublished Doctoral Dissertation, Univ. of Penn., 1973.

19. Havemann, E. & P. West, They Went to College: The College Graduate in America Today, N.Y.: Harcourt, Brace, 1952.

20. Hunt, S.J. "Income Determinants for College Graduates and the Return to Educational Investment" Unpublished Ph.D. Dissertation, Yale U. 1963.

21. Jinks, J.L. & D.W. Fulker," Comparison of the Biometrical, Genetical, Mava and Classical Approaches to the Analysis of Human Behavior" Psychological Bulletin, May 1970, Vol. 73, No. 5.

22. Kagan, J. & S. Tulkin. "Social Class Differences in Child Rearing during the First Year" in The Origins of Human Social Relations , ed. by H.R. Schaffer, Academic Press, 1971.

23. Kaldor, N. "A Model of the Trade Cycle" Economic Journal, Vol. L,1940,p.78-92.

24. Kendall, M.G. and A. Stuart, The Advanced Theory of Statistics, Griffin, London, 1961.

25. Kohen, A., Parnes,H. & J. Shea, "Income Instability Among Young and Middle-Aged Men" Center for Human Resources Research, Ohio State, 1972.

26. Kravis, I. "Relative Income Shares in Fact and Theory", American Economic Review, Vol. 49, Dec. 1959.

27. Kravis, I. The Structure of Income: Some Quantitative Essays, Phila., 1962.

28. Lebergott, S. "The Shape of the Income Distribution" Amer. Econ. Review, June 1959, pp. 328-47.

29. Little, J. A State-Wide Inquiry into Decisions of Youth About Education beyond High School, Univ. of Wisconsin, Madison, 1958.

30. Lydall, H. The Structure of Earnings, Oxford: Clarendon Press, 1968.

31. Mandelbrot, B. "Paretian Distributions and Income Maximization" Quarterly Journal of Economics, Feb. 1962, pp. 57-85.

32. Merton, R. Social Theory and Social Structure

33. Miller, H. Income Distribution in the United States, 1960. Bureau of the Census Monograph, Washington, D.C. 1966.

34. Miller, H. "Annual and Lifetime Income in Relation to Education: 1939 to 1959." Amer. Econ. Review, Dec. 1960.

35. Mincer, J. "The Distribution of Labor Incomes: A Survey with Special references to the Human Capital Approach"J.E.L., March 1970,Vol.III,No.1.

36. Mincer, J. "Schooling, Experience and Earnings"N.B.E.R. Mimeo, Feb. 1973.

37. Project Talent. The American High School Student, Cooperative Research Project No. 635, Univ. of Pittsburgh, 1964.

38. Reder, M. "A Partial Survey of the Theory of Income Size Distribution" in Six Papers on the Size Distribution of Wealth and Income, ed. L. Soltow, N.B.E.R. 1969.

39. Mittler, P. The Study of Twins, 1971 Penguin Books.

40. Roy, A.D. "The Distribution of Earnings and of Individual Output" Economic Journal, Sept. 1950, pp. 489-505.

41. Sewell,W.H. & V.P. Shah. "Socioeconmic Status, Intelligence, and the Attainment of Higher Education" Sociology of Education , 40, Winter:1-23.

42. Simon, B. & Ellison, A. "Does College Make a Person Healthy and Wise?" in Does College Matter? , ed. by L. Solmon & P. Taubman, Academic Press, N.Y. 1973.

43. Solmon, L."The Definition and Impact of College Quality"N.B.E.R. Working Paper #7, 1973.

44. Solmon, L. & P. Wachtel, "The Effects on Income of Type of College Attended" Forthcoming in Sociology of Education.

45. Spence, M. "Market Signalling" mimeo, Harvard U. 1972.

46. Taubman, P. & T. Wales, Higher Education: An Investment and a Screening Device, N.Y.: N.B.E.R. forthcoming.

47. Taubman, P. Schooling, Ability, Nonpecuniary Rewards, Socioeconomic Background and the Lifetime Distribution of Earnings, N.Y.: N.B.E.R. forthcoming.

48. Thorndike, R. & E. Hagen. Ten Thousand Careers, N.Y.: John Wiley and Sons, Inc. 1959.

49. Tinbergen, J. "On the Theory of Income Distribution" in Selected Papers, Amsterdan: North Holland Publ.Co., 1959.

50. Wales, T. "The Effects of School and District Size on Education Costs in British Columbia" 1972 Discussion Paper #83, University of British Columbia.

51. Wise, D. Academic Achievement and Job Performance: Earnings and Promotions, Doctoral Dissertation, Berkeley, Calif. Univ. of .

52. Wolfe, B. "A Socioeconomic Analysis of Family Building Behavior" Unpublished Doctoral Dissertation,Univ. of Penn., 1973.