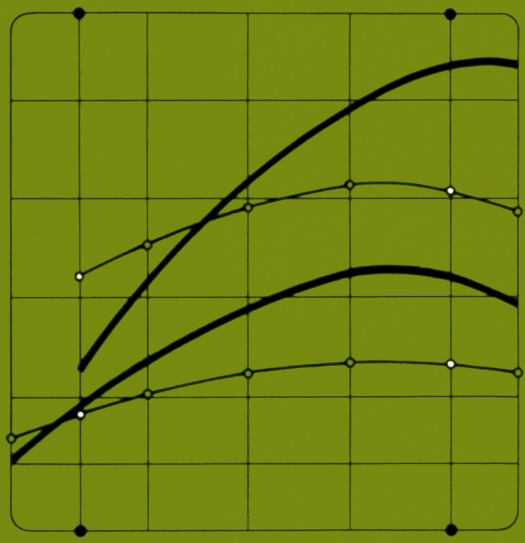
EARNINGS STRUCTURE AND HUMAN INVESTMENT

A Comparison Between the United States and Japan

HARUO SHIMADA



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A Comparison Between the United States and Japan

by

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Preface

This volume is a research report based on my comparative analysis of earnings structures in labor markets in the United States and Japan, conducted during 1972 and 1973 while I was in the United States. The original version was submitted to the University of Wisconsin in partial fulfillment of doctoral degree requirements.

In this research I compare the shapes of experience-earnings profiles and analyze their differential structures for different segments of the labor market in the United States and in Japan. My special interest was with the similarities and dissimilarities in the roles that occupational experience, a form of human investment, plays in determining the profile of earnings in the two countries with different labor market institutions.

The comparative analysis was made exploiting voluminous data sets containing roughly comparable information for the two countries: Data are from the Survey of Economic Opportunities and National Longitudinal Survey of Educational and Labor Market Experience for the United States and the Basic Survey of Wage Structures for Japan. Although the data used in this analysis are fairly old by now, the publication of this book will still contribute meaningfully in enriching professional knowledge as it contains the most comprehensive comparative information on the experience-earnings profiles ever made available for the two countries. This information is useful not only for those specialized in wage issues but also for those interested in income distribution, organizational problems of employment and industrial relations systems and other aspects of the labor market.

I would like to dedicate this book to late Professors Hisashi Kawada and Gerald G. Somers who had guided me to the field of labor studies both in Japan and in the United States but passed away before its publication.

March 1981
Keio University, Tokyo
The Author

Acknowledgements

to the Original Edition

The goal of this study was to compare the structure of earnings in the United States and in Japan with special reference to the effect of occupational experience. To achieve this rather ambitious task, a vast amount of human and physical resources had to be assembled. This small piece of research therefore presents evidence of the indispensable cooperation of a number of people, to whom I would like to express my sincere appreciation.

My deepest gratitude is directed to Professors Gerald G. Somers, Solomon B. Levine and Glen G. Cain for their inestimable help at various times and on various aspects in carrying out my research. Professor Somers initially oriented me to this project, paved the way to promote it, gave suggestions and advice when needed, and even carefully corrected errors in my expressions in the final draft. Professor Levine secured voluminous sets of Japanese wage data for my use. His inspiring discussion often enlightened me as to important points. Moreover, his constant and considerate guidance made our life in this foreign setting very pleasant and made us feel at home. Indeed, had I not been invited to visit him in Madison, I would probably have not had an opportunity to accomplish this research at the University of Wisconsin. Professor Cain was the major and most helpful source of my methodological training. His advice and assistance was extremely instrumental in formulating my research strategy properly.

I am greatly indebted to Professors Hisashi Kawada, Kōtaro Tsujimura, Yōko Sano, and Shunsaku Nishikawa, who made my visit to the United States possible and provided me with unfailing spiritual support throughout the period of my stay. I acknowledge particularly the assistance of Professors Sano and Nishikawa who constantly sent me desired data and new information from Japan.

At various stages of my research, I have received invaluable benefits from

professors both inside and outside of the University of Wisconsin. Professor Everett M. Kassalow introduced me to the intriguing research area of international comparison. Professor Leonard W. Weiss helped me in constructing and updating the data on U.S. industry characteristics. Professor Mary Jean Bowman kindly provided me with a place and an opportunity to acquaint myself with current accomplishments of the Chicago School on human capital studies. Professors Robert Evans Jr. and Kōji Taira many times gave me constructive and inspiring comments on my earlier efforts. Professor Kazutoshi Koshiro obtained a collection of Japanese Wage Surveys for me in Tokyo, and Professor Masu Uekusa brought me unpublished documents on Japanese industry concentration ratios.

I am also grateful to Professors Authur S. Goldberger, Mikio Sumiya, Jack Barbash, W. Lee Hansen, and Jeffrey G. Williamson for their helpful advice, comments, or suggesitons; to Professors Norris L. Tibbetts, George S. Hagglund, and Harry E. Graham for providing me with opportunities to participate in extension programs of the School for Workers through which I was exposed, however briefly, to the flavor of grass-root wage issues of American workers; to Professors Walter Galenson and Vladimir Stoikov for giving me a basic introduction to labor market analysis when I spent the first year in the United States at Cornell University. I am indebted to Masatoshi Kuratani, Stuart M. Schmidt, Yiu-Kwan Fan, Christopher Berger, and members of Applied Welfare Economics Workship, Workshop on Wages and Empolyment, and Industrial Relations Dissertation Workshop for their useful discussions and comments.

My sincere thanks are extended to a number of people whose help was crucial to my project. Luise E. Cunliffe, Robert M. Kuhn, and David T. Ching of the Data and Computation Center for Social Sciences provided reliable and competent programming aid. My colleagues, Stephen M. Hills, David R. Zimmerman, Pamela J. Heath, Christopher R. Fraser, and Stephen A. Rubenfeld assisted me in making my English readable. Yasuko Makino of the University of Illinois Library and Naomi Fukuda of the University of Michigan Asian Library helped me to obtain necessary data unavailable in Madison. Ross Peterson, Laurine St. Pierre, Margaret Druse, Patricia Meinesheimer, and Masako Ohnishi devoted their time in the early phase of coding and editing the data. Jeanette C. Fegler, Sandra L. Offerdahl, and Gladys L. Rowe helped me efficiently in going through the complicated adminstrative red-tapes of the university bureaucracy.

In preparing the final draft, I had a luck to receive excellent help from Barbara D. Dennis who gave me many lessons on the editorial aspect and demonstrated for me how written English can be made alive by correcting part of my draft, and from Mary ann E. Sveum who performed marvelously the arduous job of typing manuscripts and a large number of tables.

I am grateful to U.S. Department of Labor for providing financial support and to the Graduate School of the University of Wisconsin for compensating part of computational expenses.

Finally, I owe my special thanks to my wife, Kimiko, for her patience, ecouragement, and earnest cooperation throughout the process of the research. Her help was indispensable for completion of this volume.

Needless to say, I am solely responsible for all the remaining errors and deficiencies.

April 1974
Madison, Wisconsin
The Author

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CHAPTER I.
INTRODUCTION

The rise of workers' earnings with experience is a phenomenon commonly observed in many countries.[1] The United States and Japan are not exceptions, as upward sloping experience-earnings streams can be observed widely in both countries. However, the shapes of these streams in the two countries are not entirely similar, although they share many common features. When these earnings profiles are examined across different occupational or industrial segments, the structures of their differentials at times show remarkable cross-national similarities, but they differ sharply in some instances.

Since earnings are returns to labor services, they provide the basic data for the economic analysis of the efficiency of labor services. And insofar as earnings received by workers are determined through bargaining under certain employer-employee relationships, they provide the key data for industrial relations analysis. Further, to the extent that earnings are determined within certain structural and environmental contexts in the labor market, they supply indispensable information for analysis of the structure of the labor market.

One of the most remarkable developments of the last decade for the analysis of the structure of earnings are the human capital theories.[2] The human capital approach, by viewing a worker as possessing investable productive assets, such as skill and knowledge, provides a basic hypothesis for an explanation of why a worker's rate of earnings increases as his education and/or experience increases.

While the human capital view rationalizes rigorously the basic trend of experience-earnings streams, its simple model either does not offer explanations of why the shapes of the streams differ across different nations and different segments of the labor market, or it simply implies that the amount of human capital investment differs in such a way as to permit different earnings profiles.

For those who regard customs, power, and the institutions in industrial relations as well as the structural elements of the labor market as important determinants of earnings, the different shapes and differentials of earnings streams suggest a host of other implications. This group of scholars includes proponents of the internal labor market theory, the labor market segmentation view, the nenkō joretsu system, and the institutional labor economists.[3]

By analyzing observations of the structure of earnings in the United States and Japan, I attempt in this book to interpret the findings in the light of the human capital theories and other pertinent theories. Although the dearth of directly comparable and reliable data is recognized, nevertheless the primary objective of this research is to estimate the shape and structure of experience-earnings profiles comparatively, using nationwide samples.[4] A second objective is to relate the empirical findings to the above mentioned theories and, hopefully, to evaluate the usefulness of the hypotheses of each.

The necessary information is obtained by analyzing the following sets of data, using regression analysis: for the United States, the file of the Survey of Economic Opportunities 1966 (the S.E.O. data) and the file of the National Longitudinal Survey of Work Experience of Men 45-59 Years of Age (the Parnes data); for Japan, the 1967 Basic Survey of Wage Structure. In addition to these major data sources, supplementary information on industry characteristics was obtained from various relevant reports such as the Censuses of Manufactures of both countries, Industry Wage Surveys of the United States, unpublished Japanese data on product market concentration, etc.

Because I am attempting to compare sets of data which had been collected and organized originally for different purposes, their use here is subject to several limitations:

1. Part of the U.S. data was eliminated from analysis to make the Japanese and U.S. data comparable.
2. A considerable amount of information contained in the U.S. data is not usable, since there is no match in their Japanese counterpart.
3. My analysis is confined to male workers in both countries.
4. The desired data for the U.S. are available only for one year, 1966. Because of this constraint and even though Japanese data are available for several different years, I decided to make a cross-sectional analysis using Japanese data for 1967, which is the closest to the available U.S. data in timing.
5. The data are organized differently. While the American data are available in the form of individual sample observations, the Japanese data are available only in the form of grouped cells. But since information on group weights are available, the use of the weinghted regression for the Japanese data enables me to make meaningful comparisons of slope coef-

ficients between the two countries.

Several limitations in interpreting the findings and in my evaluation of them should also be emphasized. First, the fact that my study is confined to cross-sectional analysis tends to introduce a bias in underestimating the impact of economic development. For example, in a rapidly growing economy, the profiles of workers' expectations about prospective earnings streams would be much steeper than those which are estimated from actually observable cross-sectional data. This factor may indeed be very important when evaluating earnings profiles comparatively between the United States and Japan, countries whose growth performance has been quite different, at least in the past fifteen years of so.

Another example of this limitation relates to the issue of the stage of economic development in Japan.[5] If the Japanese economy was indeed in the process of rapid development with a relatively abundant supply of labor, the interpretation of the nenkō wage might be significantly different from what it would be if the analysis is made assuming a state of long-run equilibrium. In the latter case the low wage (perhaps lower than the marginal productivity) during the early phase of a worker's career should presumably be offset by the high wage (higher than the marginal productivity) toward the end of his career. In the case of rapid economic development, because of the dynamic growth of labor demand, the nenkō wage system as a whole might be interpreted as an exploitative low-wage system under which workers might be, in effect, financing the firm, quite contrary to the usual implication of the market economy.

Second, it should be borne in mind that in this analysis the aspect of mobility is handled only implicitly. For example, the issue of inter-firm mobility is treated indirectly by the separation of experience obtained in the firm of current employment (internal experience) and experience gained elsewhere (external experience). Implications of interoccupational and interindustry mobility will be considered only implicitly when I examine interoccupational or industrial earnings differentials. Further, it should be noted that in equating the earnings profiles conceptually with a worker's path of occupational career, as in this analysis, it is assumed implicitly that mobility patterns are such as to permit this interpreatation. Since I do not have a sufficient amount of independent observations of mobility corresponding with the earnings data, these problems of mobility are not considered explicitly in th analysis.

Finally, it should be kept in mind that throughout the discussion, the assumption is that the sole independent variable of a man's occupational choice is earnings and other factors are assumed to be constant, although such factors as the discount rate or time preference and preference for alternative earnings profiles are considered explicitly. I realize that there are a number of other important determinants of occupational choice, but to

simplify the discussion, many factors such as fringe benefits, prestige, satisfaction, and other nonpecuniary and unmeasurble aspects are intentionally excluded.

The remainder of this book will be divided into five chapters. Chapter 2 will develop the conceptual framework in which elements of relevant and heterogeneous theories are related and integrated. Models for empirical analysis will be specified in Chapter 3 and properties of the data will be discussed. In Chapter 4, the results of the regression analysis will be presented, and in Chapter 5, I evaluate the findings and speculate about their implications. Brief concluding observations are provided in the final chapter.

Notes to Chapter I

1. For example, see the extensive research of Lydall (1968). Several research articles edited by Meij (1963) also disclose this universal tendency in the structure of earnings. Indeed, this dimension of the structue of earnings has been recognized from a much earlier date. Reynolds and Taft, in their book of a comprehensive international review of wage structures (1956), discuss this dimension as "personal differences."
2. A review of the literature indicates that the human capital theories were developed originally in an effort to explain the residual variations in economic development which are unexplained by the different degrees of physical capital investment. In the early sixties, notable developments in the human capital theories have been achieved chiefly in connection with the role of education which increases the quality of human resources (Schultz 1961 and 1963). See also reviews by Bowman (1966), Kiker (1966) and Schultz (1971).

   The particular set of human capital theories to which I refer in this dissertation are the ones which focus more specifically on the roles of occupational experience and on-the-job training. In this respect, the epochal break-through was made by Mincer's early work (1957). Mincer has advanced rigorous analyses of the role of experience in his later contributions (Mincer 1962, 1970 and 1971). A remarkable development in the human capital theory of training was achieved by Becker's comprehensive analysis of the problem published in his widely read book (1964). It is well known that his introduction of the concept of specific training in contrast to general training has stimulated the development of a series of theories of specific human capital, Parsons (1970), Pencavel (1972), and Kuratani (1973), which are related to the subject of this dissertation research. Oi's contribution (1961) should also be noted which , though developed separately from Becker's theorizing effort, offered an explanation for the employer's specific investment in his employee and for the rising wage stream with the worker's length of service.

   From the viewpoint of the human capital approach, rigorous theorizing efforts have been made to rationalize the occupational choice behavior, too. These efforts need to be mentioned since they relate to one of the important implications of our empirical findings, namely the role of experience and prospective earnings profiles in determining a worker's occupational choice. Among notable contributions are Ben-Porath (1967), Rosen (1972), Weiss (1972) and King (1972). There are numerous other contributions which are worthwhile for citation along the lines of human capital theories which analyze the role of experience in post-school earnings. A comprehensive review of these noteworthy contributions has been made recently by Bowman (1973).
3. Principal proponents of the internal labor market hypothesis are Peter B. Doeringer and Michael J. Piore. On the basis of their intensive field research in the Boston labor market and elsewhere, they have suggested a new structural, behavioraristic and institutional ap-

proach to capture the structure and working of the labor market. Their findings were reported and suggestions were made in Doeringer (1967), Piore (1968 a, b). Their persistent works in this direction which have continued ever since their dissertatin research have recently been synthesized in a book (Doeringer and Piore 1971). I refer to this book in this dissertation as a convenient summarizing statement of their internal labor market hypothesis.

It should be emphasized, however, that the view phrased for convenience as the "internal labor market" hypothesis which is associated with Professors Doeringer and Piore may not be understood adequately in separation from the tradition of institutional analysis of the American labor market. I do not pretend to make a review of institutional labor market theories of the United States or list extensively major proponents of institutional labor economics here. But I would like to mention that the internal labor market theory is, at least in part, an outgrowth and refinement of a series of theorizing efforts attempted by institutional labor economists which may be found in such contributions as Slichter (1941), Lester (1946, 1948 and 1952), Myers and Shultz (1951), Reynolds (1951), Raimon (1953), Kerr (1954), Dunlop (1957), Livernash (1957), Slichter and Others (1960) and Myers (1964). For an extensive review of the tradition of American institutional labor economics, interested readers are referred to an ambitious survey by Fearn (1973).

Although there have been innumerable research studies in the past which reported and analyzed inter-racial, regional, sex and other kinds of differentials in earnings a group of scholars proposed recently a new approach to analyze and understand the phenomenon of what they term the dualistic labor market, labor market segmentation or labor market stratification. While their concepts appear to need more polishing and refinement, the idea of segmentation itself seems to be relevant to the subject of our research. Since I will refer to the idea of segmentation later in my discussion, though in my own interpretation of it, it is felt necessary to make some reference at this point to the works of the proponents of segmentation theories, however heterogeneous they may be. A comprehensive review of a variety of segmentation theories and concepts up to early 1972 may be found in Gordon's provocative book (1972). In addition to this book I would like to refer to some important works by Doeringer (1968), Harrison (1971 and 1972), Bluestone (1970) Bluestone and others (1971), Edwards (1973), Gordon and others (1973), Piore (1972 and 1973) and Doeringer (1973).

Among numerous works in analyzing the nenko system, we may list: Ōkouch, Kazuo, "Chinrodo ni Okeru Hokentekinaru Mono (Feudalistic Elements in Wage Labor)" in *Keizaigaku Ronshu* (Tokyo: Tokyo University Press) and Ōkouch (1959), articles contained in Sumiya's Collection of works (1964), articles reprinted in Ujihara (1966), Tsuda (1961 and 1968), Fujita (1961), Funahashi (1966), Hazama (1964), Koike (1966), Umemura (1967). Kobayashi (1966) and Yamamoto (1967) also provide ample research findings concerning the structure and working of employment systems in the Japanese internal labor markets.

4. Of the published comparative research studies thus far, the most closely related to the objective of my research, to the knowledge of the author, is the work by Evans (1971). Yet this remarkable achievement still suffers considerably from the dearth of comparable data. He complains:

> It will be only partially possible to follow the most desirable practice and focus upon the same type of differentials in both countries because, ..., the institutional functioning of the labor markets has been quite distinct and, as a natural consequence of these institutional differences, the governmental data collection systems have concentrated upon alternative dimensions of the employment relationship.
>
> .....This has meant that scholars and governments have asked different questions and collected dissimilar data for the two economies. (Evans, 1971 p. 153).

Although the data sets used in our analysis have not been collected for the purpose of cross-national comparison, as repeatedly cautioned, and thus are not ideal ones for such a comparison, by taking advantage of their virtues such as nation-wide coverage of the samples and comparable variables obtainable from the surveys and also by exploiting the quantitative rigor of regression analysis, I attempt to develop comparable information between the two

countries on the shape and structure of earnings profiles which is more reliable than heretofore available to us.

5. In relation to the issue as to when the Japanese economy has taken off from the primitive stage of development with unlimited supplies of labor, the issue which was provoked initially by a well known model presented by Lewis (1954), there has been a controversy between those who see the turning point in the late nineteenth century (Fei and Ranis 1964) and those who recognize it to have taken place as late as in the 1960's Minami (1970). See also Taira (1970), Ohkawa and Rosovsky (1973) and Odaka (1973). Although it is not our purpose to comment on this controversy, here, if the view was adopted that the Japanese economy has been undergoing the rapid growth and structural change during the 1960's, it should be noted that interpretations of our cross-sectional data would not be the same as the case in which the Japanese economy is viewed such as to permit the assumed long-run equilibrium for her cross-section observations.

CHAPTER II.
CONCEPTUAL FRAMEWORK

We shall develop in this chapter an integrated view of the mechanism which generates and maintains the structure of experience-earnings profiles. The purpose of this exercise is to present a conceptual framework which will serve as the basis on which to build models for empirical analysis and also to evaluate the results.

While we will develop our conceptual framework primarily along the lines of the human capital approach, we will at the same time try to integrate elements of other pertinent theories into our perspective. In constructing the framework, elements contained in the following theories will be included (though sometimes only implicitly): the human capital theories of occupational experience, the paradigm of the internal labor market, models of the nenkō system, the thesis of American labor market dualism, and the theory of the dualistic structure of the Japanese labor market.

Through the examination of these elements, the proposed conceptual framework points to the determinants of supply and demand behavior which give rise to the structure of earnings profiles. As the determinants of the quality and quantity of labor supply we will consider prospective earnings profiles, human capital investments, "expectancy" of workers, family backgrounds and resources, etc. As for the determinants of the demand for labor, we will take into account prospective wages, human capital investments, the degree of uncertainty associated with the quality of the labor force, industrial and environmental characteristics, etc.

This chapter will be organized in three sections. The first section deals with the factors which generate various forms of experience-earnings profiles. The second section focuses on sources which are responsible for perpetuating differentials among the earnings profiles of different segments of the labor market. The final section offers a brief overview in order to pave the way for specification of models for the subsequent empirical analysis.

1. The Experience-Earnings Profile

Let us begin our discussion with a review of human capital theories. The basic idea of human capital theory is that investments in human capital of a worker increase his productivity in the future. In a competitive market in which the rate of earnings of a worker equals his marginal productivity, investment in the worker tends to increase his rate of earnings in the long run equilibrium. If it can be assumed that investments are made in a worker during the process of his experience on the job, these investments are expected to generate an upward rising earnings profile (Mincer 1962, 1970, 1971).

Needless to say, the earnings profile, since it reflects the worker's marginal productivity, may cease to rise or even fall when the obsolescence of learned skill and knowledge occurs or physical and mental ability of the worker diminishes for reasons like aging (Sen 1966).

This model, which predicts equality between the earnings profile and the efficiency profile of a worker, was shown to be a special case by Gary Becker. He suggested by introducing the notion of specific training that the earnings profile can deviate from the efficiency profile for individual workers. (Becker 1964).

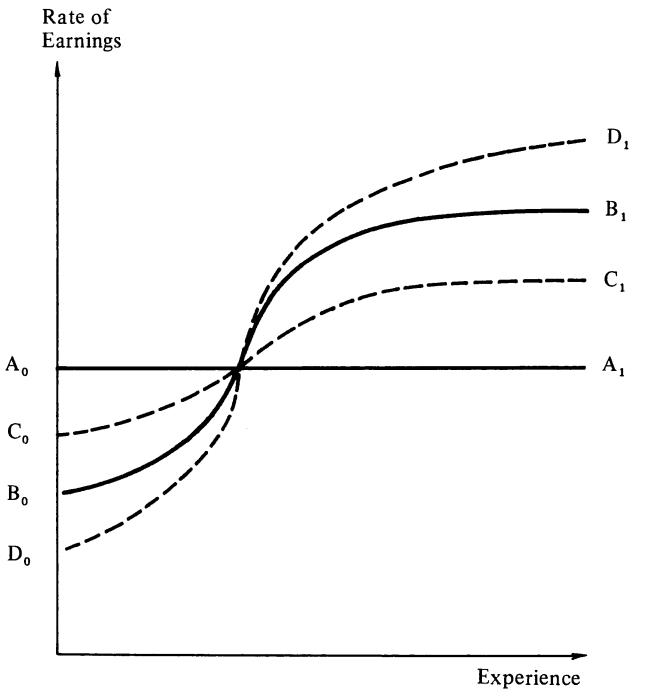
Specific training is defined as the training which increases the trained worker's efficiency only within the firm which provided the training and does not change his efficiency in other firms. Since specific human capital is useful only within the training-providing firm, the employer is willing to finance the specific training aiming at collecting returns after the training by means of paying wages lower than the worker's post-training efficiency. This relationship of profiles of earnings and efficiency may be conveniently illustrated by the following diagram.

Line A is the hypothetical earnings profile of a worker who has taken no training. Line A also represents the profile of his marginal productivity. Line B is the hypothetical profile of his marginal productivity in case he has taken training. If this training was of a Becker-general type and thus the worker has born the cost of training, his earnings profile would be line B, which is identical to his efficiency profile. If the training was specific and the employer paid some cost of the training, then his earnings profile would deviate from the efficiency profile as exemplified by line C.

The range within which his post-training wage rate is determined, however, by his alternative wage rate at the lower bound (presumably equivalent to his efficiency without including the effect of specific human capital) and by his post-training efficiency at the upper bound. To put it in terms of Diagram I the profile of earnings of a worker such as C can deviate from the efficiency profile B but only within the boundaries as represented by lines A and B.

Diagram I

Profiles of Earnings and Efficiency



In Becker's model these boundaries are maintained by competitive forces of the labor market. Furthermore, the determination of the post-training wage rate itself, as suggested by Becker, depends crucially on the worker's propensity for turnover. This point was recently formalized by Kuratani in his two period optimization model of joint investment (Kuratani 1973). He has formally elaborated the concept of quit and lay-off propensity by formulating the production function for specific human capital and the subjective probability distributions of alternative job offers.

Introduction of the element of uncertainty in the realm of human capital and occupational choice theories would produce a number of interesting behavioral implications tied to experience-earnings profiles (King 1972, Weiss, Y. 1972, Sorensen, 1972).

But instead of elaborating these implications along the lines of concrete human capital theories, let me make use of the concept of expectancy which has been proposed by Victor Vroom (Vroom 1964) and developed by his followers through the expectancy theory of motivation. This concept, in my

opinion, resembles closely the economic concept of choice under uncertainty. I have introduced this concept partly to give a broader look at the above discussed implications of human capital theories and also to relate to some of the conceptual elements contained in the nenkō paradigm.

In essence expectancy theory postulates that an individual's action whether to choose an occupation or to enhance his performance in the occupation, depends 1) on the weighted sum of the valence of the outcomes of the action and 2) on the individual's expectancy of the induced outcomes.[1] One of the interesting implications which may be suggested from the expectancy theory is that an earnings profile may take a form like profile D deviating from boundaries such as lines A and B.

Let us elaborate on this point in some detail. The employer was unable to pay higher than the upper bound because he had to pay during the period of training at least as much as the worker's actual productivity. If he had been able to pay lower than this rate, there would be no reason why he could not pay higher than the upper bound in the post-training period. Therefore, the key constraint must be the lower bound imposed during the training period.

The enforcing condition was essentially that, in a competitive labor market, the employer is unable to recruit or retain workers with a wage lower than their actual marginal productivity which workers would attain during the training. Two reasons are conceivable why it is impossible for an employer to do so. One is that the worker can not afford to finance his training at such a low wage rate even though greater-than-marginal productivity wages are guaranteed after the training. The other is that even if the worker is able to finance his training at this low wage, it is uncertain from the worker's point of view that a greater-than-marginal productivity wage will actually be paid in the future.

But in view of the fact that there are many people in the society who are willing to finance their training by themselves (for example higher education), we are led to believe that it is the second reason, namely the perceived uncertainty by a worker concerning future rewards that makes it difficult for the employer to pay lower than marginal productivity wages during the early phase of employment. If the deferred payment of greater-than-efficiency wages is guaranteed for the worker through some rules or regarded as certain in his subjective judgment, then the employer could recruit the worker at a very low wage rate and consequently the effectiveness of the lower bound (portion of line B below A) would be nullified. This suggests that when workers have a high expectancy of future rewards a steep earnings profile such as D in Diagram I could be generated not incompatibly with the usual assumptions of a competitive labor market. This provides an interesting parallel with the scheme of the nenkō wage paradigm.

While theorists of the nenkō system do not deny the view that the upward sloping nenkō wage profile reflects an increasing efficiency profile of a

worker (Taira 1966, Taira 1970), it is widely accepted that under the nenkō system a worker receives during the early phase of his expected employment period wages which are lower than his marginal contribution to the firm and receives later in the period wages which are higher than his productive contribution to the firm (Fujita 1961).

We have discussed so far necessary conditions for the deferred payment system to take place. To see sufficient conditions, we need to take a look at the conditions under which the employer prefers such an arrangement. Or to put it differently the conditions which regulate demand behavior. At least two points should be mentioned in this regard. One is the employer's immediate need for capital and the other is the perceived certainty of future prosperity.

These two conditions are likely to occur when the economy is in a state of rapid growth or inflation. An interesting implication of this arrangement which needs to be stressed is that the employer is being financed under this system by workers by taking advantage either of the insufficient information that workers have during a period of rapid inflation or of the insufficient employment opportunities that exist in a basically labor surplus economy.

The nenkō paradigm also suggests interesting implication in the aspect of the valence of the expected outcomes. The nenkō model emphasizes as one of the basic principles of the earnings distribution the cost of living compensation principle (Funahashi 1966, Magota 1972). It presumes that the life-cycle pattern of minimum cost of living rises steeply up to the age of retirement. This principle is observed by employers to assure the reproduction of the labor force in a basically low wage economy. If these presumptions were indeed true, then it is possible that the valence is higher for a steeply upward rising expected earnings profile than for a flatter profile. In other words, the valence depends also importantly on worker's needs which are determined not only by physical necessities but also by the environmental conditions of the society.

Further, some scholars who emphasize institutional aspects of the labor market offer institutional and descriptive theories of the structure of earnings profiles which might be entitled as "equity" theories of wages.[2] I will refer to this view later in Chapter 5 in connection with the evaluation of specific problems.

2. Differential Structure of Earnings Profiles

Let us now turn to the question of differentials among earnings profiles of different segments of the labor market such as differentials between different occupational or industrial segments.

To illustrate the nature of the issue let us consider a simple model of a labor market which is partitioned into two but not entirely unrelated segments.

In the previous section we have delineated that the expected value of earnings obtainable from an occupational career depends on many factors such as the individual's knowledge about prospective earnings, pattern of time preference, expectancy, perceived uncertainty, needs, employment opportunity, taste, etc., that the assessment of his preference between alternative occupational careers is quite a complex task. But for the sake of simplifying our discussion let us suppose that the expected values of prospective earnings streams may be expressible on a one dimensional scale.

Suppose that the wage rate for a measurable efficiency unit of labor differs for some reason between the two segments of the labor market. If competitive market forces are operative this differential should be suppressed eventually in the state of an equilibrium. Market forces will work in two ways. One is that workers in the low wage segment will want to move to the high wage segment. Increased competition for occupations in the high wage sector would bid down their wages. On the other hand the employers in the high wage segment will want to employ low wage workers from the low wage sector. It should be born in mind that in this simplified model the term occupation is used instead of job. By this we mean that the model implicitly encompasses the question of long-term occupational choice and not merely the short-term choice of jobs.

This model may conveniently be illustrated by using the the following diagram. In Diagram II, along the vertical axis the expected value of the prospective earnings stream is plotted and along the horizontal axis the quantity of labor in terms of efficiency units is measured.

Suppose at the initial stage different rates of expected earnings existed such as E_0^1 and E_0^2 in segment 1 and 2 respectively. If competitive market forces are operative, because of their operation in the two directions as described above, the amount of employment would be reduced in segment 2 from L_0^1 to L_1^1 and as a result the initial differential in expected earnings would be suppressed and yield the equal rate for both segments such as E_1^1 or E_1^2.

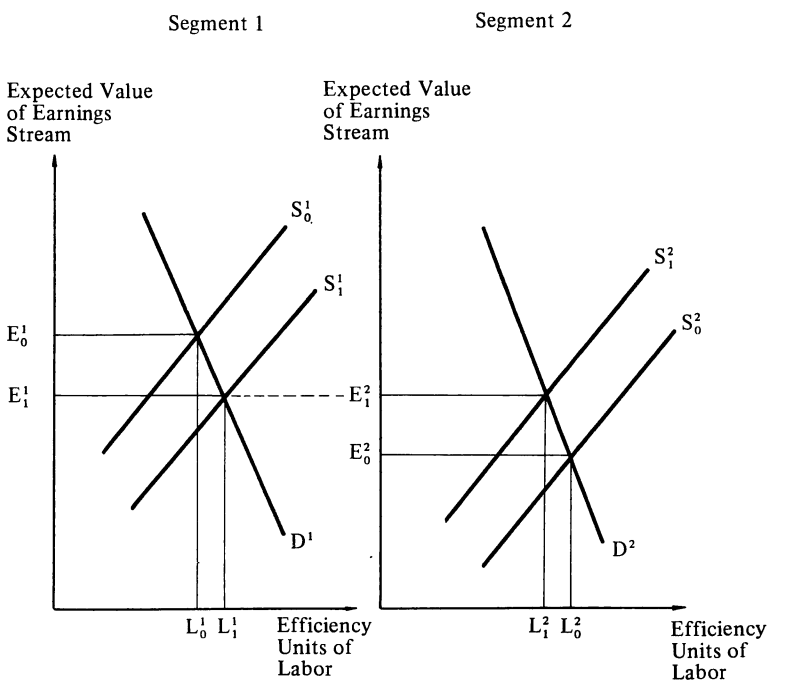
If the earnings differential were not suppressed in the long run, we would doubt whether the suggested market forces have operated effectively in the direction of restoring the equilibrium rate of earnings.

The market segmentation theories emphasize barriers to the free mobility of labor and assert that market opportunities are restricted much more against some segments of the population than others.[3] In the remainder of this chapter, I would like to discuss my interpretation of a market segmentation view. It attempts to emphasize that differentials in the rate of earnings for the same measurable efficiency amount of labor services may be perpetuated in the long run due to the constant operation of factors which disturb the working of competitive market forces.

It was noted earlier that market competitive forces which restore the

Diagram II

A Model of Sub-Divided Labor Market



Note: Subscripts 0 and 1 indicate the initial stage and the stage of restored equilibrium respectively. Superscripts 1 and 2 denote segments 1 and 2 respectively. E stands for the expected value of prospective earnings stream and L represents the amount of labor measured in terms of measurable efficiency units.

common equilibrium rate of earnings would work in two ways: Namely the movement of the labor force from the low to the high wage segment which would increase the supply of labor in the high wage segment on this one hand, and on the other hand the increased recruitment of low wage workers from the low wage segment by employers in the high wage segment which would also increase the supply of labor to the high wage segment. In other words, both streams of operation of market forces would result, for the model in Diagram II, in shifting the labor supply schedule downward or equivalently outward from the original position of S_0^1 to S_1^1 (Standing and Taira 1973).

That the initial earnings differential is being perpetuated therefore implies that there exist some factors which bar the operation of these forces. That is, some factors are preventing the flow of labor from the low wage

segment into the high wage segment and other factors are disturbing the high wage employers from recruiting workers from the low wage segment. Let us therefore discuss these two groups of disturbances. The first group of factors will be entitled as "restricted supply of labor" and the second group under the title of "selective demand for labor."

Restricted Supply of Labor

First, the scarcity of market information has to be emphasized as an important factor which restricts the smooth flow of labor from the low into the high wage segment. The scarcity of market information and the costliness of search for information have recently attracted an increasing amount of attention from economists and stimulated the development of the economics of job search (Stigler 1962, McCall 1970). Studies in the economics of job search have offered a new insight into the nature of wage differentials. That is, wage differentials can be created because of imperfect information which is due basically to the limited amount of search made by both job-seekers and employers which is being constrained by the expected benefit-cost ratio of search activity. The flow of the labor force from the low to the high wage segment would not take place if workers in the low wage segment are not informed about the job opportunities available in the high wage segment. Those who are suffering from the lack of information may not even bother themselves in embarking on job search activities because of the very low subjective benefit cost ratios.[4]

Insofar as search is costly, the amount of information that individuals possess or collect will depend on how much financial and other kinds of resources they can mobilize in their search activities. An important implication of the role of information in the labor market is that the amount of market information that an individual has or can have may be systematically related to such factors as financial, occupational and cultural resources of the family, and environmental resources of the community, in addition to his innate ability.

Second, the role of uncertainty should be stressed. Uncertainty is closely and negatively related to the amount of information. When the degree of uncertainty is high the expected value of earnings would be low. To be more rigorous, this statement depends upon the assumption that the individual is risk-averse. If risk-aversion is not an unreasonable assumption for the choice behavior of a worker, then uncertainty would be expected to play a discouraging role in affecting the mobility of labor between the segments of labor market. That is, when high uncertainty is associated with occupations in the high wage segment the flow of labor from the low wage segment to the high wage segment is discouraged (Todaro 1969).

Uncertainty can arise from many factors. For a job seeker much of the prospective earnings from the occupation he tries to choose is not known with

certainty. This uncertainty is multiplied by the possibility of unemployment. Perhaps an even more important element of uncertainty for him is associated with his entry itself. When applying for a high wage occupation, his chance of success through competition may not be high. When he sees a high degree of uncertainty in his entry he would be discouraged from applying for the occupation even though expected earnings before adjusted by uncertainty may be high (Salop and Salop 1972).[5] Likewise the distribution of information, the degree of perceived uncertainty may also be related systematically to family backgrounds and other environmental resources.

Third, the costs of mobility need to be discussed. The flow of labor from the low to the high wage segment is also restricted by the costs incurred in the shift of workers, whether geographical, occupational, inter-firm or otherwise. In addition to the obvious direct costs of transportation, housing and other physical necessities, the cost of foregoing expected earnings from the original occupation plays an important role. This cost of course has to be compared with the expected gains from the occupational shift. But the point is that this cost can be large when the worker would not be able to utilize the special skill in the new occupation which he has used in the original occupation or when he had reasons to expect large future earnings if he had stayed in the old occupation.[6] On the other hand, when the perceived uncertainty associated with the new job is high this will also add to the expected costs involving the shift. Besides, there are psychic costs of losing friends, missing the familiar environment etc. which as stated in Chapter 1, are excluded from our explicit consideration.

The degree of barrier associated with the costs of movement is also reasonably expected to relate to the amount of endowed resources mentioned earlier.

Through the examination of these disturbances, it is suggested that even in the system of presumably competitive markets, the unequal distribution of endowed resources does give rise to and help perpetuate earnings differentials through their constant operation.

Thus far, we have examined one side of the complex of obstacles, namely the factors which result in discouraging the flow of labor from the low wage to the high wage segment. We will turn next to the other side of the mechanism, namely factors which reduce the demand of high wage employers for labor in the low wage segment.

Selective Demand for Labor

First, let us review the role of market information and uncertainty perceived by the high wage employers. The implication of scarce information for employers is more or less symmetrical with the case of job seekers except perhaps an individual employer would likely be more informed than an individual job seeker. When the availability of low wage workers is not

known, the high wage employers would keep paying high wages for the limited amount of labor supply available to them. What may be more important is not simply the sheer lack of information on availability of cheap labor but also the employers' perceived uncertainty concerning the quality of the low wage workers. For the employers the cost of search has two meanings. One is the cost of searching for potential employees whose supply price is low. The other is the search for the quality of the applicants. The latter is costly and time-consuming.[7] When employers perceive greater uncertainty in the quality of low wage workers, they try to employ cheap labor only up to the point that gains from the low wage are at least as much as the expected costs associated with the uncertainty of the productive efficiency of low wage workers. Therefore, when high wage employers are not knowledgeable about the availability or at least the productive characteristics of low wage workers, the earnings differential between the segments can be perpetuated.

Second, in conjunction with the issue of uncertainty I would like to discuss the meaning of qualifications or selection criteria for entry to these wage occupations. In view of the difficulty in predicting the future performance of a worker as mentioned earlier and also the fact that employers do usually select among applicants on the basis of only limited and apparent criteria such as education and experience, it seems that the selection ranking of applicants can not reflect their productive efficiency exactly. It may reflect the efficiency partly but not completely. Thus it is not unreasonable to think that the residual variation represents some sort of de facto social or organizational credentials. And if these credentials are related adversely to the characteristics of low wage workers, demand by the high wage employers for these workers becomes in effect selective. Some workers will be screened out because of failure to satisfy some of credentials even though their supply price is not higher than that of high wage workers for a tangible efficiency unit. And this selective demand behavior is in effect restraining the amount of supply to the high wage segment by weeding out from the labor pool those candidates who just do not meet some arbitrary credentials.[8]

Finally, the effect of external forces which restrain demand for cheap labor deserves a brief mention. It is often observed that entry to high wage occupations is limited by institutional forces imposed by ingroups (Culbertson 1973). Restrictive practices of some unions in high wage industries or professional organizaions in highly rewarding professions are typical examples. Employers would refrain themselves from getting external cheap labor for fear of expected high costs of struggles with those restrictive unions. Supply of labor to some high wage occupations is limited for reasons such as high costs in satisfying the imposed qualifications.

We have pointed out three factors, thus far, which give rise to selective or restrained demand behavior. It is suggested that the constant and in-

teractions of these disturbances and the other set of disturbances aforementioned which restrict the supply of labor can maintain and reproduce earnings differentials between segments even for the same amount of tangible efficiency units of labor.

3. An Overview-Structure of the Model

Thus far, we have examined and attempted to relate components of heterogeneous but relevant theories pertaining to the shape of experience-earnings profiles and the structure of their differentials.

In Section 2, we have seen that the human capital models based on the efficiency view may be treated as special cases of a more general model which allows for a greater variety of shapes of earnings profiles than suggested by the human capital approach.

In Section 3, we have considered various factors which give rise to persistent differentials among the earnings profiles of different segments or the labor market.

In other words, in both sections we have examined beyond the scope of usual human capital variables a whole variety of factors which are deemed important in giving rise to the structure of earnings profiles. These factors are in effect determinants of the quality and quantity of supply and demand of labor as implied in the foregoing discussion.

Although I will not state formally, our discussion in this chapter has suggested implicitly the following structure of our conceptual model. The quality and quantity of the supply of labor depends on the prospective earnings profile, human capital investments, expectancy, the valence of the earnings profile defined by needs, the family's financial, occupational and cultural resources, community and other environmental resources, and inherited ability. The quality and quantity of demand for labor depends on the prospective profile of pay, human capital investments, expected demand for the product, technological properties of capital equipment, the employer's position in labor and other factor markets and in the product market in terms of degree of monopsony and monopoly, the degree of uncertainty associated with the quality of labor, costs of search for quantity and quality of labor,and expected institutional costs imposed by external forces such as unions.

The shape and structure of earnings profiles will be determined through the interaction of these structural functions of demand and supply of labor. Our earnings equations are thus conceived as a reduced form of these structural equations.

When simplified by letting X denote the vector of all of the arguments of demand and supply functions except for human capital, our reduced form may be expressed simply as

$$(1) \qquad Y = f(h, x)$$

where Y represents earnings and h stands for the amount of human capital.

As stressed in Chapter 1, being restricted by the paucity of comparable data between the two countries, we do not have a sufficient amount of empirical information which can represent elements of vector X. The only comparable data usable for analysis are broad occupational and industrial classifications. Other relevant variables relating to X are race (in the case of the U.S.) and the nation itself. These variables, as suggested by earlier discussion in Sections 2 and 3, relate to the components of vector X. In the following empirical analysis therefore we will estimate earnings equations written generally by equation (1) under various specifications.

Notes to Chapter II

1. The original model of the expectancy theory put forth by Victor Vroom (1964, pp. 3-48) has been further developed and elaborated by later proponents of the theory. The current model distinguishes between the first level outcome and the second level outcome. The level of performance achieved by the initial effort is viewed as the first level outcome, and a variety of rewards to the attained performance is regarded as the second level outcomes. Expectancy of the second level outcomes viewed from the level of performance is sometimes called "instrumentality." One's expectancy is, in this elaborated model, postulated to depend on the weighted sum of valence of the second level outcomes and instrumentality which is adjusted by the expectancy of the first level outcome. A review of these recent developments may be found in Campbell and others (1970) and more recent reviews may be found in Mitchell and Bigham (1971) and Schwab and Heneman (1972).
2. I owe this "equity" point of view that summarizes the complex set of rules to his suggestion in personal correspondence of Professor Robert Evans Jr. See also his book, Evans (1971), which stresses this view of wage determination. The roots of the "equity" principle view may be found in the literature of American institutional labor economics, some of which were cited in Footnote 3 of Chapter I. The nenko model of Japan may be regarded also as a specific example which demonstrates the working of the equity principle.
3. For the works of market segmentation theorists, see a brief list presented in Footnote 3 of Chapter I. It needs to be emphasized that segmentation theorists do not reject the efficiency view. Indeed they stress a large difference in the level of efficiency between workers in the primary labor market and in the secondary labor market. However, their further contribution may be found in their emphasis and analysis of the structure and the process through which the efficiency and work attitude of workers are differentiated.
4. Professor Piore explores environmental and other causes which give rise to the peculiar occupational choice behaviors and work attitudes of low-productive, unstable workers in the secondary labor market; Piore (1972) and "Fragments of a 'Sociological' Theory of Wages," mimeo (1972). In advancing my discussion, however, I posit a view which imposes a benefit-cost interpretation on the peculiar occupational choice behavior of unstable, less productive workers.
5. There may of course be a whole variety of other uncertainties associated with the intrinsic and extrinsic values of the new job and also with the environmental conditions of the new occupation. These issues are, however, not explicitly considered here.
6. For instance, one may list such arrangements as vested pension plans, retirement allowances. Especially in the case of Japan, bonuses may be viewed as inducements for commitment, as their rate often accelerates with the length of service under the same employer.

7. The role of uncertainty associated with the quality of a worker may be important in selecting among applicants whose quality is largely unknown. Some scholars maintain that this factor is responsible for part of discriminatory selection by the employer. See Arrow (1971).
8. I am focusing here on the role of the credential effect as a factor to explain residual earnings differentials which remain beyond the measurable efficiency differentials. It should not be confused that I view the earnings differentials between segments of the labor market as being caused solely by the social credential effect while the measurable efficiency of workers in the two segments is the same. As stressed in Footnote 3 of this chapter, the segmentation theorists also emphasize the efficiency differentials among workers. It should be kept in mind, however, that in my simple model the unit of labor services is standardized by some measurable efficiency units, and therefore the difference in the measurable efficiency units possessed by individual workers is outside the focus of the model.

CHAPTER III.
MODELS AND THE DATA

1. Introduction

The discussion in Chapter 2 has laid out the basic objectives for our empirical analysis. In pursuit of these objectives this chapter will specify models and also discuss properties of the data which will be used in our analysis.

Our basic objectives may be restated essentially in three points: (1) to estimate the effect of experience in determining the rate of earnings, (2) to compare the effect of experience across different segments of the labor market (occupational and industrial segments), and (3) to compare and evaluate these points of interest between the United States and Japan in terms of similarities and dissimilarities.

These objectives will be sought using a method of quantitative analysis, namely regression analysis. Letting Y represent the rate of earnings, Ex represent experience and Z stand for a vector of other determinants of earnings, an earnings equation may be written as

$$(2) \qquad Y = f(\mathrm{Ex}, Z)$$

Viewed as a reduced form the slope coefficient of Ex can be interpreted to represent both the demand and the supply factors of labor. The direction and magnitude of these dual effects can not be rigorously distinguished and identified without specifying the structural equations of demand and supply. Nevertheless, our qualitative interpretations of results will be made basically along the lines of demand and supply behavior as considered in the conceptual framework of Chapter 2.

We will develop our models in four sections: (1) aggregate earnings equations with experience and education, (2) the same set of equations as applied separately to samples of manual and non-manual workers, (3) the same equations as applied separately to groups of manufacturing industries either

dominated by large establishments (large-scale industries) or by small establishments (small-scale industries), and (4) equations which explicitly include variables to represent both inter-industry variations in demand and structural factors in addition to human capital variables.

2. Aggregate Experience-Earnings Profiles

The basic purpose for specifying a set of equations in this section is to estimate the shape of the distribution of earnings with respect to experience. As such the purpose of models in this section is also descriptive.

The specific points of interest relating to the shape of experience-earnings profiles are: (1) the effect of experience on earnings, (2) the extent of non-linearity, if any, in the way experience affects earnings, (3) the magnitude of an inter-action effect between experience and education, and (4) differences or similarities in these three aspects between the United States and Japan.

Although our major focus in the earnings equations is on the effect of experience, we will always include eduction in the equation. It should be added quickly that experience *Ex* is the same thing as age, as will be explained later, after controlling for the years of education *Ed*. It was felt necessry at least to add the variable of education in order to avoid the likely bias caused by compounding the effect of education with the effect of experience especially in view of the ample findings that education exerts an important effect in increasing earnings.[1]

Our basic model thus may be written as

$$(3) \qquad Y = f(\mathrm{Ex}, \mathrm{Ed})$$

where Y stands for the rate of earnings, *Ex* is experience and *Ed* is education. This model will be specified in several different ways. Prior to specifying the functional forms let us discuss the variables.

Earnings

Earnings are the sole dependent variable in our models. The theoretical construct of earnings is the rate of earnings for a certain unit of labor service. Earnings include not only wages but also other types of rewards such as salaries and bonuses. Earnings however do not include non-labor incomes such as rents, profits, dividends, transferred incomes etc. Earings are paid in various different ways in terms of types, forms and time units.

We converted these various measures of reported earnings into a single measure, namely the hourly rate equivalent of gross earnings primarily for two reasons.[2] One is our judgement that a worker's earning capacity can be expressed best by his hourly rate since it is free from the possible distorting bias caused by the difference in hours of work. The other is the necessity to

maintain cross-national comparability. The American data are reported either in terms of the hourly wage rate or in other forms which can be convertible to the hourly rate. The predominant form of earnings data for Japan, on the other hand, are monthly earnings which are subject to differences in the hours of work. But it is possible to estimate the hourly equivalent of monthly earnings when information of monthly hours of work is available. Fortunately this information is available from most of the tables of Japanese data which will be used for our analysis.

Another problem relating to the Japanese earnings data is the issue of special payments most of which are bi-annual bonuses which amount annually to an equivalent of three to five months of regular wages or salaries. Since the differences between wage policies of monthly regular payments and bi-annual bonuses themselves are of special interest, we will report simultaneously the results of both cases, namely the case of monthly contracted cash earnings only and the case of total cash earnings including bonuses.[3]

Experience

There are different theoretical constructs for experience depending upon theoretical views concerning the role of experience in determining earnings. In the context of the human capital approach, experience is taken to mean the amount of knowledge and skill that is useful in performing the job, namely experience is a component of human capital (Mincer 1962, Mincer 1969). From other points of view, however, experience might be interpreted to represent the rank in an organizational hierarchy, power, or the degree of commitment etc. While with our limited information it is difficult to discern these different elements from our gross measure of experience, we are able to shed some light on heterogeneity in the nature of experience by devising three different measures of experience: gross experience (*Ex*), internal experience (*Ex* 1) and external experience (*Ex* 2).

Gross experience (*Ex*) is defined as the current age of a worker minus the age at which he finished his highest level of formal schooling. As noted earlier, given the level of education, this is essentially capturing the age.

Internal experience (*Ex* 1) is a component of *Ex* and is defined as the number of years a worker has spent on the current job. The knowledge and skills acquired through internal experience are presumably more useful in performing the current job than those acquired through experience elsewhere. Apart from this view, internal experience may be taken to indicate the amount of organizational resources possessed by a worker.

External experience (*Ex* 2) is defined as the residual length of period which remains after subtracting internal experience from gross experience. External experience is presumed to be less closely related to the current job than internal experience and as such is expected to be less effective in raising the rate of earnings.[4]

Education

Education is measured by the number of years of formal schooling. Like the variable of experience the theoretical construct of eduction differs depending upon how the role of education is viewed in determining earnings. From the human capital approach, education would mean the amount of general knowledge and competence acquired by a worker through formal schooling which is useful in performing the job for which he is paid. From the other standpoints education may simply be one of the social credentials which give rise to social stratification. Taken either way measurement of the sheer number of years of formal schooling may well be subject to deficient construct validity.[5] Since we have not found either view completely convincing and yet we do not have sufficient information to disqualify either of them, we will use the number of years of formal schooling as a descriptive measure of education without committing ourselves to either view completely.

The American data on formal education are given in terms of continuous grades although many of the respondents fall in a few year-brackets which correspond to the particular years of graduation from certain levels of schools such as elementary school, high school and college. The Japanese data, on the other hand, are provided in terms of four categories corresponding to four major schooling levels, namely junior high school, senior high school, junior college and college.[6] It should be added that the reported educational categories for manual workers in the Japaneses data are limited only to junior and senior high school levels.[7] In the American data, we will use as a measure of a worker's education the highest grade completed as reported by the worker.

Using these variables a set of regression models will be specified in order to investigate our points of interest empirically.

Model 1

Model 1 is a simple linear representation of our basic earnings functions expressed by equation (4). Model 1 may be written as

$$(4) \qquad Y_i = b_0 + b_1 \mathrm{Ex}_i + b_2 \mathrm{Ed}_i + u_i$$

where Y is the hourly rate equivalent of earnings, Ex is gross experience, Ed is education, and u is a random disturbance term. Our major interest is in the slope coefficient of Ex. For obvious reasons, we expect positive values both for b_1 and b_2.

Empirical findings which would be obtained from Model 1 are expected to serve several purposes. One is that because of the simplicity in the functional form the results can be compared readily with different data sets. There are reasons to suspect whether this model would yield the unbiased estimate of the effect of experience primarily because of the omitted variable problem. Moreover the linear formulation may produce misleading results if non-

linear forms were indeed more appropriate. Notwithstanding, Model 1 is useful in that we can learn and evaluate the appropriateness of other specifications by comparing their results with the results of Model 1, which in effect performs the role of a bench-mark.

Two additional comments are in order. One relates to the treatment of race for the American data, and the other to the comparability of units of the dependent variable between the United States and Japan.

Throughout our analysis of aggregate earnings functions we will treat the white and non-white populations separately. There are two major reasons for this. One is our analytical interest in comparing the mechanism by which differential earnings are generated between white and non-white groups.[8] The other reason relates to the nature of the data. In both the SEO and the PARNES samples, the non-white population is more heavily represented than the white population. The method of splitting the sample will avoid possible causes of bias which might be introduced to our estimates of slope coefficients because of these unequal sampling ratios.

Now turn to the second point. One of the factors which poses difficulty for meaningful comparisons between the United States and Japan is in the difference in the units of money. As of the years in which the data were collected, the formal exchange rate has equated one U.S. dollar to 360 yen of Japan. If these units were employed directly as units of the dependent variable, the value of slope coefficients for Japan would appear to be unduly large relative to those of the United States. It is possible to express Japanese earnings in terms of U.S. dollars by converting through use of the international exchange rate. This would, contrary to the above method, perhpas understate the slope coefficients of the Japanese equations since one view maintains that in 1966 and 1967 the yen was undervalued and did not reflect the true inter-national market equilibrium. Recognizing these difficulties we determined to adopt U.S. cents as the basic unit for the dependent variable in both countries since comparability requires some common unit of measure.

Model 2

Model 2 is proposed partly because of our suspicion of a non-linear relationship between experience and earnings and partly because of our interest in the role of the interactive effect between experience and education in determining earnings. To capture non-linearity a quadratic form ($Ex + Ex^2$) will be used and the product of education and experience ($Ed\ Ex$) will be added as another independent variable to represent the interaction effect. Model 2 may be written as

$$(5) \qquad Y_i = b_0 + b_1 \mathrm{Ex}_i + b_2 (\mathrm{Ex})^2_i + b_3 \mathrm{Ed}_i + b_4 \mathrm{EdEx}_i + e_i$$

where e is a random disturbance term.

The purpose of this model is two fold: (1) to measure the degree of non-linearity which may characterize the effect of experience on earnings,[9] (2) to study the nature and strength of the interaction effect between experience and education.[10]

Hypotheses behind a quadratic form of experience are complex. From the human capital point of view the marginal effect of experience on earnings is expected to be positive but the effect diminishes as a worker gets older. In other words the experience-earnings profile takes a concave shape viewed from the experience axis. Reasons for this concavity are (1) that learning occurs most intensively during the early phase of a worker's career (Becker 1964), (2) that obsolescence occurs for learned skills and knowledge (Sen 1966), and (3) that human capital results in physical depreciation with age. Theories of learning also anticipate a concave profile for the learning curve though for different reasons (Tiffin and McCormick 1965). From the organizational wage administration point of view, the direction and magnitude of the slope coefficient attached to the squared term of experience relates to a number of factors such as the structure and organization of jobs in the internal labor market, the intra-organizational system of promotion, the composition and system of wages or salaries, and labor management policies in terms of allocating rewards etc. (Doeringer-Piore 1971). The expected value of the coefficient depends thus on so many elements that it is hard to conclude a priori expectation from this point of view.

Hypotheses underlying the interaction term are also quite complex in nature. From the human capital point of view a positive interaction between education and experience is expected on the ground that a greater amount of general knowledge learned through formal schooling such as reading and calculating abilities increases the efficiency of learning skills on the job (Holtman 1971).

The organizational wage administration point of view would suggest that differentiated wage policies exist when applied to groups of workers differing in terms of educational attainment. For example the employer provides high rewards to the internal experience of college graduates but not so much to the internal experience of workers with lower education. From the standpoint of a worker's occupational choice, the interaction effect may be taken to imply different time preference patterns held by groups of workers differing in terms of educational attainment. If it is anticipated that the workers with higher education are more likely to prefer high incomes later than those with a lower education, a positive interaction would be expected.

In sum, our expectations would depend on the relative importance of the aforementioned factors such as the positive human capital effect, wage administration factors (ambiguous) and the occupational choice factor (ambiguous).

Model 3

Model 3 may be termed as a "partial logarithmic form of the earnings equation." As mentioned earlier, this model will be used in our study mainly for convenience of cross national comparison.[11] The model is advantageous in that the slope coefficients are free from the difference in the units of money between the two countries and may be read as percentage changes in the dependent variable.[12] Model 3 is written as

$$(6) \qquad \ln Y_i = b_0 + b_1 \mathrm{Ex}_i + b_2 \mathrm{Ed}_i + v_i$$

where $\ln$ stands for the natural logarithmic transformation and v is the random disturbance term.

Coefficient b_1 may be read to represent the percentage amount of impact across the entire range of the earnings distribution due to a one year increase in experience on earnings. Coefficient b_2 can be read as the marginal impact of education on earnings expressed in perentage changes on earnings.

It should be born in mind however that this method, while it is admittedly convenient for the purpose of comparison across heterogeneous samples, is subject to an important restriction. The restriction is that the measured slope coefficient becomes an appropriate estimate of percentage changes only to the extent that the data behave in a manner which can be expressed by the natural logarithmic function. If the data were not well-behaved the measured slope coefficient would not approximate the marginal percentage changes properly. It should also be stressed that the marginal impact is expressed in percentage terms for the earnings distribution of the given set of the sample. For example, when we compare the marginal impact of experience between white and non-white samples using Model 3 the slope coefficient of the non-white sample only implies percentage changes in the range of non-white earnings and should not be taken to imply changes in the total range of the distribution including both white and non-white samples.

Model 3 implicitly takes the non-linear effect of experience and education on earnings into account to the extent that the curvature is approximated by the natural logarithmic transformation. Therefore we will not specify in the text other variations of Model 3 which include squared variables and interaction terms. But the results of these modified models will be reported in the appendix tables.

Model 4

Model 4 employs a set of dummy variables to account for in a more general way the non-linearity, if any, associated with the effect of education on earnings. The model includes also a quadratic form of experience and interaction terms of education dummies and linear experience variables. Model 4 may be expressed as

$$(7) \qquad Y_i = b_0 + b_1 \mathrm{Ex}_i + b_2 (\mathrm{Ex})_i^2 + \sum_{j=1}^{3} b_{j+2} D_{ji} + \sum_{j=1}^{3} b_{j+5} D_{ji} \mathrm{Ex}_i + w_i$$

where D_j $j = 1,2,3$, represent dummy variables corresponding to three levels of schooling and w is a random disturbance term.

Because of the difference in the system of major school levels between the United States and Japan, D_j does not stand for exactly the same school levels. The following table shows how D_j corresponds to the actual accumulated years of schooling in each country.

The basic reason why Model 4 uses a set of dummies to capture the non-linear effect of eduction is our a priori anticipation that the effect of education on earnings is discontinuous. That is, while the effects on earnings of the one and two years of education that high school dropouts have may not differ sizably, the education of dropouts and the full high-school education on earnings differ markedly. We might call this discontinuous relationship a "diploma effect."

Education Dummies and Corresponding Accumulated Years of Schooling: The United States and Japan

	The United States		Japan	
D_1	elementary school	0–7 years	senior-high school grads.	12 years
D_2	high school grads. and college drop-outs	12–15	junior college grads.	14
D_3	college grads. and higher education	16–20	college grads.	16
Base Group	elementary school grads. and high-school drop-outs	8–11	junior-high school grads.	9

Model 4 is advantageous also in that it is capable of describing the shape of a non-linear relationship more closely than simplistic functional forms such as a quadratic form. In addition, in studying the nature of the eduction-experience interaction this model can indicate more clearly than previous models whether differential interactive effects exist which differentiate the effect of experience on earnings by education.

We expect a positive slope coefficient for the linear part of experience and ascending positive values for D_j. As for the coefficients of squared experience and interaction terms, expectations are abmiguous for the similar reasons discussed in the specification of Model 2.

We have so far developed four models based on the basic models as expressed by equation (2) in which experience was represented by gross experience Ex. Models 5 through 7, specified below will depend upon a dif-

ferent basic model which employs a combination of internal experience *Ex* 1 and external experience *Ex* 2 to represent experience. This model may be given generally as

$$(8) \qquad Y = f(\text{Ex } 1, \text{Ex } 2, \text{Ed})$$

There is a serious constraint imposed on this model by the limited availability of data. While the Japanese data provide information of *Ex* 1 and *Ex* 2 for workers of all age range, the same information is available only from workers in the age range of 45 through 59 in the case of the U.S. data. Details of this constraint will be discussed later in this chapter. In order to facilitate as close a comparison as possible, a subset of the Japanese workers of the comparable age range as their American counterparts will be selected and analyzed comparatively. But this will leave out an important age range in which *Ex* 1 and *Ex* 2 may play interesting roles in determining wages. Supplementary analyses will be made to meet this point of interest using the Japanese data which can give the desired information for the total age range. The fact that the U.S. data are confined to the range of relatively old ages would affect the estimated slope coefficients of experience. It is anticipated that the declining trend in the effect of experience shows up more conspicuously in the analysis of old age range than that of total age range.

Model 5

Model 5 is a simple linear representation of our basic model expressed by equation (9). The purpose and use of Model 5 are comparable to those of Model 1. The model is written as

$$(9) \qquad Y_i = b_0 + b_1 \text{Ex1}_i + b_2 \text{Ex2}_i + b_3 \text{Ed}_i + e_i$$

where *Exl* is internal experience and *Ex*2 is external experience and the rest of notations are equivalent for previous models.

Hypotheses behind slope coefficients of *Ex*1 and *Ex*2 deserve some discussion. Like previous models, here again different views can hold simultaneously. As mentioned earlier, the human capital view postulates that both b_1 and b_2 are positive and b_1 is greater than b_2. Reasons for these expectations are (1) that occupational experience, whether this was earned within the firm of current employment or elsewhere, should increase the amount of human capital held by the worker and (2) that the marginal effect of *Ex*1 in increasing the kind of human capital useful in performing the job for which the earnings are reported (Becker 1964, Parsons 1970) is greater than the marginal effect of *Ex*2 because of the "specificity" of experience.

From the point of view of organizational wage administration, especially in connection with the concept of internal labor market (Kerr 1954, Doer-

inger and Piore 1971) similar expectations will be derived. Where the rules and the structure of internal labor market are well developed, internal promotion and internal training are emphasized and wages are administered and distributed accordingly. Naturally under these circumstances the experience obtained by a worker within the internal labor market, if other things are equal, tends to be evaluated more highly in the administration of promotion than the experience acquired elsewhere and hence the rate of earnings. Thus b_1 is expected to be greater than b_2. From the standpoint of a worker's occupational choice, expected values of b_1 and b_2 would depend crucially on the pattern of time preference and taste. If workers prefer steeply rising earnings profiles toward their old ages and if employers are trying to induce workers' commitment by giving higher rewards for a longer commitment then it might be expected that the value of b_1 is greater than b_2.[13] But there are so many contingencies involving this view that a clearcut expectation is not generally derivable from this view. Although we are not ready to assign relative importance to these alternative views, there seems to be little disagreement in expecting a greater value for b_1 than b_2. There are however some problems in determining our expectations about a positive or negative sign for b_1 and b_2. The problems relate mainly to the fact that our data are limited within the range of old ages in which depreciation of physical and perhaps mental ability is occurring more rapidly than in the other age range. The coefficients b_1 and b_2 do represent this marginal decline of the stock of human capital due to the effect of aging as well as the positive marginal effect of experience in adding human resources. Therefore from our theory although we expect positive values for b_1 and b_2, the actually observed values may be either positive or negative depending on this mixed nature of measurements of $Ex1$ and $Ex2$.

Model 6

The purpose of this model, similar to Model 2, is to ascertain the nature of non-linearity of the effects of different forms of experience and also of their interactions with education. Like Model 2, this model applies a quadratic form to approximate the shape of a non-linear effect of experience. Model 6 may be written as

$$(10) \qquad Y_i = b_0 + b_1 \mathrm{Ex1}_i + b_2 (\mathrm{Ex1})_i^2 + b_3 \mathrm{Ex}_i^2 + b_4 (\mathrm{Ex2})_i^2 + b_5 \mathrm{Ed}_i + b_6 \mathrm{EdEx1}_i + b_7 \mathrm{EdEx}_i^2 + e_i$$

The notations are common with other models specified earlier.[14]

We expect that the values of b_1, b_3, and b_5 are positive and b_1 is greater than b_3. Reasons for these expectations are evident from our foregoing discussion. Our expectations for coefficients of squared experience terms and of interaction terms are ambiguous. Basic reasons for the ambiguity are that

several alternative views are applicable but no relative importance may be attached at this stage of limited information theoretically to these different expectations.

Model 7

Model 7 is a variation of Model 5 in that the dependent variable is transformed into a natural logarithm. This model is comparable with Model 3 in terms of its purposes and use. Model 7 may be written as

$$(11) \qquad \ln Y_i = b_0 + b_1 \mathrm{Ex1}_i + b_2 \mathrm{Ex}_i^2 + b_3 \mathrm{Ed}_i + e_i$$

where notations are common as in Model 3 and other previously specified models. Since properties and hypotheses of this model are much the same as Model 3, no further elaboration will be made. In our empirical analysis however we will analyze the data, in addition to using Models 5, 6 and 7, variations of Model 7 and the counterpart of Model 4 which employs $Ex1$ and $Ex2$ in stead of Ex. Results of these models will not be reported directly but will be utilized as supplementary information for evaluation.

3. Disaggregated Earnings Profiles for Blue-Collar and White-Collar Occupations

Considerations in Chapter 2 have suggested that a number of determinants of labor supply and demand functions operate differently between different occupational careers. These differences were implicitly reflected in the coefficients of experience and education of the aggregate earnings equations. But to the extent that these differences are theoretically expected to relate systematically with the difference in the type of occupational career, the model should include the variable representing the type of occupation explicitly so that some of the compounding biases are eliminated from the estimated slope coefficients of experience and education.

Based on this reasoning, this section will specify models which may be expressed generally as

$$(12) \qquad Y = f(\mathrm{Ex}, \mathrm{Ed}, O)$$

where O represents the type of occupational career.

The types of occupational career used in our analysis are restricted because of the limited availability of comparable data between the United States and Japan, to the two types, namely blue-collar and white-collar occupations. This dichotomy has however an advantage in that it provides perhaps the most obvious and basic distinction in terms of the nature of the occupation. This distinction has been recognized as one of the most con-

spicuous dimensions of social stratification in both countries (Blau and Duncan 1967, Yasuda 1971).

When occupation is introduced as a variable in the earnings equation it is expected that the slope coefficients associated with experience and education change. Our point of interest is not only whether they change but also by how much and more specifically how different the slopes are depending on the type of occupation. Although it is not impossible to capture these differences by a combination of the variable of occupation and its interactions with other variable, it was decided to split the sample according to the type of occupation instead of adding these variables in a single equation. The method of splitting the sample is advantageous in that the results are often easier to interpret especially when the original equation has a complicated functional form.

Thus our models for empirical analysis may be expressed basically as

$$(13) \qquad \begin{aligned} Y_b &= f_b\,(\mathrm{Ex}, \mathrm{Ed}) \\ Y_w &= f_w\,(\mathrm{Ex}, \mathrm{Ed}) \end{aligned}$$

where subscripts b and w stand for blue-collar and white-collar occupations respectively.

Specific forms of these equations are the same as those specified in the previous section, namely Models 1 through 7.

4. Disaggregated Earnings Profiles for Large-Scale and Small-Scale Industries

This section is concerned basically with the role of the size of a firm as a dimension of labor market stratification. It is widely believed that the size of a firm is the single most important factor which segmentalizes the Japanese labor market (Ujihara 1954, Ohkawa 1962, Odaka 1967). In the United States, in contrast, while a wage differential of considerable magnitude is known to be associated with the size of an establishment (Lester 1967) there have been so far only few attempts which analyzed the structure of wages directly with respect to the size variable (Rees and Shultz 1970). Notwithstanding, findings of many inter-industry studies suggest indirectly an important role played by the size variable in differentiating wages or stratifying the labor market (Weiss 1966, Masters 1969, Averitt 1968, Haworth-Rasmussen 1971).

Our conceptual considerations in Chapter 2 have implied that various determinants of the demand and supply of labor operate differently between the large and the small firm sectors. While the direct information on the size of an establishment is available from the Japanese earnings data the similar information is unfortunately unavailable directly from the earnings data of the United States. On the other hand, it is possible to construct comparable data between the two countries by means of separating industry groups by

the criterion of whether the group has a large proportion of large establishments or a small proportion of them. For the purpose of maintaining comparability we will classify manufacturing industries between a "large-scale industry block" and a "small-scale industry block."[15] The detailed list of large-scale and small-scale industries in the United States and Japan are presented in Appendix Tables C-1 and C-2.

Our interest is in the difference in the effects of experience and education associated with the two classifications by industry. To seek this point we chose again the method of splitting the sample between these segments for the same reason as mentioned in the previous section.

We have therefore specified our models which may be expressed generally as

$$(14) \qquad \begin{aligned} Y_1 &= f_1\ (\mathrm{Ex}, \mathrm{Ed}) \\ Y_s &= f_s\ (\mathrm{Ex}, \mathrm{Ed}) \end{aligned}$$

where the subscripts 1 and s represent the large-scale industry segment and the small-scale industry segment respectively. Similar to the specification of the previous section, specific forms of these equations are the same as those specified in Section 2.

5. Inter-Industry Analysis

The purpose of specifying models in this section is to discern the compounding effects of omitted variables in the estimated slope coefficients of experience and education in models which only include explicitly the variables of experience and education. Let us call this type of a model tentatively the "human capital" model in the sense that it includes only those variables which represent human capital investments. The models specified in Section 2 of this chapter belong to this type. It should be added quickly however that this type of model includes not only supply side variables but also demand side variables as we have stressed in Section 4 of Chapter 2. That is, the variables of experience and education do constitute determinants of behavioral equations of the demand as well as the supply of labor.

Although the human capital model is not necessarily limited within the confines of supply factors its specification is admittedly deficient in the sense that it is omitting important variables which shift demand functions. For example, in a simple model in which a production function is assumed to combine physical capital input K and labor input L augmented by quality elements represented by experience Ex and education Ed, and a supply function of labor is assumed to depend on different rates of earnings corresponding to different amounts of education and experience, the earnings equation which is a part of a pair of the reduced forms of the system will be written generally as

$$(15) \qquad Y = Y\,(\mathrm{Ex}, \mathrm{Ed}, \mathrm{K})$$

If in this model K is correlated with Y and also with Ex or Ed, then the human capital model such as the specification of equation (3) is erroneous in the sense that the estimated coefficients of experience and education are biased due to the omission of relevant variables.

Our model intends to investigate the extent of the biases contained in a equation like (3) which had been caused by the omission of relevant variables by means of adding some relevant variables which are considered important in our conceptual framework. Many of the important variables are however either unmeasurable or unavailable unfortunately. Thus we were obliged to choose only a few measurable proxies: namely the capital stock K, the industry's characteristics in terms of the distribution of the establishment's size S, the industry concentration ratio C, and the industry unionization U.

The capital stock K represents the determinant for the demand function for labor. The data for this variable were obtained from the book value of fixed assets plus rental values. As we have dicussed in Chapter 2, there are a host of factors which conceivably shift the demand function. The amount of capital stock is only one of those which shifts the function outward. It is expected to give a positive effect on earnings. Further it is probable that our particular measurement of K does not represent perfectly the theoretical construct of capital stock. That is, the depreciated book value of fixed assets may in fact be only a partial meaurement of the efficiency of productive facilities with which a worker works. In sum, K is expected to have a positive impact on earnings but our measurement is by no means perfect.

S represents the size of an establishment. But our measurement, as we have discussed, represents it only indirectly. The size variable is expected to give a positive effect on earnings for various reasons (Masters 1969, Shinohara 1968, Odaka 1967) though many of them may be interpreted as compounded effects of other factors such as technology, capital equipment, financial resources, power of controlling the markets etc. Besides, our indirect measure of the size represents in effect the type of industry rather than the size of an establishment itself. These deficiencies associated with our measurement of S would probably lead to an understatement of the effect of the size.

Industry concentration ratios C are the data which had been compiled from product market concentration ratios on the basis of industry classification schemes of earnings data using employment as a weight for the United States and shipment as a weight for Japan. We let C stand for the power to control the product market. We expect that monopolistic rent tends to be greater where the degree of industry concentration is high. Thus C is expected to be associated with monopolistic rent in the product market.

Industry unionzation ratios U are calculated for the United states as the ratio of workers who are covered by the collective agreement to the total number of workers in the industry, and for Japan the number of union members within an industry to the total employment of the industry. The theoretical construct of U is union power which affects the determination of wages of union members more favorably than others.[16] Consequently we expect U to have a positive effect on earnings. Needless to say, the construct validity of U is not undebatable.

Including these additional variables, our model may be written generally as

$$(16) \qquad Y = F\,(\mathrm{Ex}, \mathrm{Ed}, \mathrm{K}, \mathrm{S}, \mathrm{C}, \mathrm{U})$$

To evaluate the possible compounding effects which may be included in the coefficients of experience and education in the human capital model, we will try several alternative versions based on equation (16) by omitting or adding the variables of interest.

One comment needs to be made on the structure of our data. While the variables of experience and education are broken down to the individual earners' level for the U.S. and to small cells of earners for the Japanese data, all other variables are defined on the level of fairly crude classifications of industry. This implies that while experience and education can capture within-industry variations of earnings, other variables can only represent between-industry variations of earnings. The disadvantage due to this broad classification may not be serious for such variables as C or U since they are defined theoretically for industry units. But the effect of this shortcoming may be considerable for vairables like K and S since these variables do have important variations within an individual industry. The failure to capture these within-industry variations may well cause underestimation of the effect of K and S on earnings.

6. The Data and the Cross-National Comparability

The Data

The primary sources of information are provided by three different sets of data: the Survey of Economic Opportunities (the S.E.O. data) and the National Longitudinal Survey of Work Experience of Men 45-59 years of age (the Parnes data) for the United States and the Basic Survey of Wage Structures for Japan.

The analysis will be confined to male workers. The male-female segmentation, an interesting aspect of labor market stratification, will therefore be omitted.

The timing of the data was almost predetermined by the availability of the

desired sets of data especially for the case of the U.S. It was fortunate that both sets, the SEO and the Parnes data are surveys of the same year 1966 so that they may be used complementarily. There was more degree of freedom in choosing the year of the Japanese data. The Basic survey of wage structures has been conducted practically every year from 1954 to the present. By the time of our analysis reports of the 1970 Survey were available. The annual survey is classified into two types in terms of the extent and intensity of sampling. The large scale survey with more intensive sampling has been carried out in selected years 1958, 1959, 1961, 1964, 1967 and 1970. We decided to choose the report of 1967 primarily because of its closer comparability in timing with the American counterpart.

Qualifications on Comparability

The data sets were created originally not for the purpose of a crossnational comparison between the United States and Japan. It was therefore felt necessary to ascertain the extent to which the different sets of data are indeed comparable between the two countries. we will discuss the comparability in terms of summary statistics such as slope-coefficients and coefficients of determination in the regression analysis and the coverage of samples.

Regression Slope Coefficient and Coefficient of Determination

One of the differences in the nature of the data sets may be found in the way in which they are organized. The U.S. data consist of original sample observations while the Japanese data are available only in the form of mean values of tabulated cells of the original sample.

When the aim of analysis is to estimate the value of a slope coefficient which characterizes the population of interest through a sample, the use of a regression method for grouped cell data of the sample will suffer from the problem of heteroskedasticity or equivalently of low efficiency. This low efficiency problem arises because the variance of each sell observation is treated as equal while it actually varies inversely and proportionately with the weight of the cell. This low precision problem may be minimized however if the cell weights are incorporated appropriately in regression even if cell means data were used. We will therefore use the weighted regression method for Japanese data to get as much precise estimates of slope coefficients as possible.[17]

In terms of our specific problem of comparability, the slope coefficients of the Japanese data thus derived by using the weighted regression method should be reasonalby comparable with the corresponding slope coefficients of the American data which consist of ungrouped sample observations.

On the other hand, the comparison of the values of coefficients of determination R^2 between the United States and Japan is not quite meaningful. Due to the fact that the Japanese data were grouped into cells, the within cell

variance had been averaged out. Consequently the coefficient of determination or equivalently the ratio of the explained variance by the model to the total variance of the dependent variable tends to be much higher than the case in which ungrouped data are used. Thus, the comparison of coefficients of determination between the United States and Japan is pointless. Since our major purpose of analysis however was to estimate the effect of experience on earnings, which is measurable by the value of slope coefficients, this defect in R^2 would not jeopardize our comparative analysis. Incidentally, comparison of goodness of fit between different models within either the American or the Japanese data is legitimate and meaningful.

Scope of the Samples

Another source of lack of comparability of the U.S. data and the Japanese data is in their difference in terms of the coverage of the sample. To put it differently, the extent of population being investigated by these sample sets is not identical.

To illustrate the difference, the U.S. data sets are samples drawn from the national population of all types of industries, occupations, with the non-white population represented more intensively than the white population. The Japanese data, in contrast, are sampled from a somewhat limited population, namely the workers in establishments employing at least ten (or in some cases five) employees in private non-agricultural industries.

The information for Japanese workers was obtained from employer's files of sampled establishments unlike the U.S. surveys which were obtained from interview information. Although the Japanese data include a type of workers who are usually referred to as temporary workers or part time workers, it is obvious from the data during the survey month that the pattern of their work is practically indistinguishable from regular workers.

When compared with the American data which include a large group of respondents who have worked only for a short time a day, worked irregularly, self-employed workers, unemployed job seekers, or those who are in and out of labor force frequently, the nature of workers covered by the Japanese survey is admittedly much more selective and uniform. In other words, the population investigated by the Japanese data may be viewed as a subset of its American counterpart, the subset being characterized in short as the regular and stable portion of workers employed in a somewhat limited subset of industries and establishments.

Given the difference between the American and the Japanese data such as this, a comparison of slope coefficients for the entire set of American data and the Japanese data would be illegitimate since the attributes of uncomparable groups are to be compared. To avoid this error a number of subgroups were eliminated from the American sample such as those who were not employed in private non-agricultural industries, those who have not or do

not work regularly etc. in an attempt to select a subset which is as closely comparable as possible with its Japanese counterpart. This elimination was not costless however. Indeed an important portion of the sample for labor market analysis was ignored. But it was inevitable since our major purpose of analysis is in the rigorous comparison between the United States and Japan which will be made possible by this elimination of non-comparable subsets.

Notes to Chapter III

1. There exists a large body of literature which suggests the importance of education in increasing earnings. See the works of human capital theories cited in Footnote 2 of Chapter I. See also Hanoch (1965) and Hanoch (1967). Our regression results indicate that the exclusion of eduction from the experience-earnings equation causes a sizable downward bias in the estimate of the experience coefficient both for the American data and the Japanese data. See for example, Appendix Table A-1(i). Addition of the education variable to the earnings equation havig experience as the sole independent variable has raised the slope coefficient of experience from .82 to 3.29 and increased the value of R^2 corrected for the degree of freedom from .004 to .234. A similar result is found for the Japanese data in Appendix Table A-2(i).
   Inclusion of education raises the slope of experience coefficient from 1.24 to 1.75 and R^2 from .467 to .691. It should be emphasized that there exists a large variance associated with the impact of education measured by the number of years of schooling on income. This fact has been emphasized by Jencks and others (1972). Indeed, over the years Mincer has consistently made efforts to discern the role of experience in explaining the large residual variation in earnings left unexplained by a simple schooling-earnings model (Mincer 1957, 1962, 1970 and 1971). See also Chiswick's effort in introducing the regional factor as an additional explanatory variable (Chiswick 1967).
2. The hourly rates of earnings of men age 45 to 59 was reported directly in the 1966 survey of Parnes data. In the 1966 S.E.O. files, there was no such direct information on hourly rates. Therefore, this rate was imputed by dividing annual earnings by 2000. This procedure could have introduced a non-negligible bias if the sample included many workers who worked much less or much more than 2000 hours. Fortunately, however, this bias is minimized in our study since we focus only on a sub-set of workers population who have worked 48 to 52 weeks during the year prior to the survey as full-time workers.
3. The hourly rate of total cash earnings, which includes special payments such as bi-annual bonuses, is henceforth abbreviated as HRYB both in the text and in appendix tables. It can be computed according to the following formula

$$\text{HRYB} = \frac{1}{\text{HR}} \quad [\text{M.C.C.E.} + \frac{\text{B.S.}}{12}]$$

   where HR represents monthly hours of work, M.C.C.E. corresponds to monthly contracted cash earnings reported in the Japanese survey, and B.S. stands for annual sum of bonuses and other special payments. Note that the data of B.S. are the sum of all such payments made during the year prior to the 1967 survey year.
4. For some workers the external experience defined above includes periods out of the labor force or unemployment which might be totally unrelated to human capital investments in increasing their productive ability. This is often the case for female workers. In our case, however, this possibility is minimal since our sample is confined to the regular and relatively stable portion of male workers.
5. The social credential effect of education is emphasized by Jencks and associates (1972). To increase the construct validity of the education variable in either way (to represent the amount of educated ability such as knowledge or skill, or to capture the credential effect) we

will have to improve the measurement of education taking into account the quality aspects of schooling (Coleman and others 1966), (Wise 1973) and the structures of discrimination and social stratification.

6. These levels are the upper four of the five levels in the new educational system adopted after the World War II. In this system graduation from these levels corresponds to accomplishing 9, 12, 14 and 16 years of formal schooling. The prewar system was less universal than this new system in that it contained more branches and optional courses which students were able to pursue. In the classification system used in the Basic Survey of Wage Structure, the prewar upper-secondary school leavers are combined with the postwar junior high-school leavers, the prewar-middle school leavers with the postwar high school leavers, the prewar special-school leavers (specialized either in industrial or commercial technique) with the postwar junior college graduates, and the prewar college graduates with their postwar counterparts. Corresponding years of schooling between the pre- and post-war systems for these groups are close but not identical in all groups.
7. Every sample observation is classified into one of the four educational levels, but it is difficult to believe that there are no dropouts. The common assumption is that the drop-out problem is minimal in the Japanese educational system in which gaining entrance is much more difficult than graduation. Even if this is true, and even if the bias which would arise by ignoring the drop-out porblem in the case of Japan is small, the problem of errors in measurement which would be caused by imposing the broad categorization upon workers' educational attainment should not be entirely overlooked. Under this broad classification system, two possible errors are conceivable. One is to classify drop-outs from senior high school as graduates of junior high school. The other is to categorize those who claimed that they had eduction equivalent to senior high school level as graduates from senior high schools even though they did not formally receive that much of education as a matter of fact. If these errors in measurement occur randomly about the true measurement, then the estimate of the slope coefficient such as the effect of education on earnings, would likely be an under-estimate of the true slope, although the magnitude of the bias depends upon the magnitude of measurement errors (Blalock 1961, pp. 143-162). The possibility of this type of bias, if any, would be greater in the case of blue-collar workers than white-collar workers if the fact that blue-collar workers are classified into only two educational levels (junior and senior high schools) indeed meant that additional education received by some of the blue-collar workers beyond the level of senior high school was ignored.
8. It is possible to evaluate the inter-racial difference by means of adding variables representing race and interactive effects between race and other included variables in the earnings equation. An alternative method is to split the sample between white and non-white and apply the same equation for the two subsets. I have chosen the latter method since it is advantageous to have the capacity to compare the effects of an independent variable between the two groups more directly, and hence interpretation is easier.
9. When the shape of non-linear relationship is unknown or there are no convincing reasons to expect some particular shapes, the most general and descriptive way to capture the non-linearity is to apply a set of dummy variables representing the mean value of each sub-divided interval of the distribution. The finer the sub-divisions, the more closely will the non-linearity be represented. But this method does have some disadvantages. One is that when a large number of dummy variables are employed to represent an irregular shape, however closely descriptive of the shape, the functional form will be extremely complicated. Consequently, interpretation is made more difficult. The other disadvantage is that limitation of the number of dummies with the intent to reduce cumbersomeness and to devise easier interpretation can be dangerous when there are no convincing reasons to expect discontinuous functional forms because it runs the risk of, in effect, forcing a particular step-wise function. Further, when interaction effects are considered explicitly, the number of variables will become quite large and this often increases the danger of multicollinarity.

   On the other hand, the main disadvantage of a quadratic form approach is in imposing this simple functional form onto a distribution which may not be well represented by it. This method, however, can be advantageous in terms of the ease of interpretation when the shape of distribution is expected not too different from the family of quadratic functions. In those cases where there are no reasons to anticipate discontinuous step-wise function, quadratic

forms may indeed be a better alternative. Since there are no reasons in our case to believe that the effect of experience has to be discontinuous at certain points, I have employed quadratic form instead of a dummy form approach. In contrast, with the education variable there are reasons to anticipate a discontinuous effect on earnings. An attempt will be made later to capture this type of non-linear effect of education by means of using a set of dummy variables in our Model 4. We will also try quadratic forms for education, and the results of which will be presented in appendix tables.

10. In Model 2 the effect of education-experience interaction is measured by the product term of linear portions of education and experience. I did not include interaction terms of squared education and experience in this model because in part we have no reasons to expect sizable interaction effects between squared education and experience variables. It was thought that interaction effects, if there are any, should be captured reasonably well by the product of linear variables. In addition, I expected that by not including many interaction terms the possibility of multicollinearity would be reduced.
11. The slope coefficient of years of education in the partial logarithmic earnings equation is given a special interpretation by Mincer. Under a set of assumptions he demonstrates that this coefficient equals the internal rate of return to schooling (Mincer 1971, pp. 7-10 and 1970). See also (Kuratani 1973, Appendix). Since this interpretation is predicted on several strong assumptions which I do not want to make in this research, I have not used this interpretation of the coefficient. The major reason why I use the partial logarithmic form lies in the fact that the slope coefficients may be made comparable by this transformation across different data sets, namely the U.S. and Japan.
12. This may be shown as follows. Suppose that our partial log earnings regression model may be written as

$$\ln Y = b_0 + b_1 X_1 + b_2 X_2 + \ldots\ldots + b_K X_K + e$$

Differentiating this equation totally, we get

$$d\ln Y = \frac{\partial \ln Y}{\partial X_1} dX_1 + \frac{\partial \ln Y}{\partial X_2} + \ldots\ldots + \frac{\partial \ln Y}{\partial X_K} dX_K$$

Solving, for example, for $\ln Y / X_1$ which is equivalent to the regression coefficient b_1 in terms of our model, we get

$$b_1 = \frac{\partial \ln Y}{\partial X_1} = \frac{dY/Y}{dX_1}$$

where other terms have dropped off because of the assumption of no exact interdependence between regressors. Thus the slope coefficeint, say b_1, is interpreted as the percentage change in Y with a unit change in X_1.

13. For example, Walter Oi in his insightful study implies that the rising profile of earnings with the length of service operates as an inducement of greater commitment of the worker to the firm (Oi 1961 and 1962). But the process by which a worker's motivation is stimulated depends on so many variables, as for example elaborated by the analysis of expectancy theory, that it is difficult to postulate simply that the expected rising earnings profile necessarily leads to greater commitment of a worker.
14. Reasons for choosing the specific quadratic forms and interactive terms are basically the same as those discussed in the specification of Model 2. See also the discussions in Footnotes 9 and 10 of this chapter.
15. The classification of "large-scale" and "small-scale" industry blocks is defined as follows. The large-scale industries are those manufacturing industries in which the ratio of employees in large establishments (1000 employees or more) to the total number of employed workers in the industry is greater than 20 percent for the United States and 8 percent in the case of Japan. Since I attempted to maintain comparability between the two countries, in the types of component industries of these two blocks, the difference in the cut-

off points was unavoidable due to the difference in the avarage size of establishments between the United States and Japan. The rest of manufacturing industries are categorized as "small-scale" industries. For the detailed list of these component industries and their characteristics, see Appendix Tables C-1 and C-2. I am thankful to Professor Leonard Weiss for his help in the process of constructing the American data.

16. A number of research studies have been made on this subject. One of the most comprehensive achievements is Lewis' contribution (1963). See also a review made recently by Ohtsu (1972) on this subject. On the Japanese scene, several articles contained in the recently published collection of Ono's works present a comprehensive treatment of the issue (Ono 1973). See also an intensive analysis made by Furuya and others (1969).
17. To make my methodology more sound on this point I have received frequent and valuable advice from Professors Arthur S. Goldberger and Glen G. Cain. Mr. Robert Kuhn has given me irreplaceable help in making it possible for me to use the weighted regression program written by him.

CHAPTER IV.
EMPIRICAL FINDINGS

In this chapter we will present the findings of our empirical analysis.[1] The presentation is divided into four sections corresponding to the four groups of models specified in chapter three: (1) aggregate earnings profiles (2) earnings profiles of blue-collar and white-collar occupations, (3) earnings profiles of large-scale and small-scale segment of manufacturing industries, and (4) inter-industry analysis.

1. Aggregate Earnings Profiles

The purpose of estimating the aggregate earnings equations was to discover the shape of aggregate experience-earnings profile for the population of each country. To accomplish this goal we estimate earnings equations using a sample drawn from workers in all industries. But the scope of "all industries" as defined in our analysis is restricted more narrowly than the scope of entire economy mainly by our consideration for maintaining comparability between the American and the Japanese data sets.

While the American data sets cover a wide range of heterogeneous workers, the Japanese data represent workers in more limited categories. The Japanese sample had been drawn from the population which consists of male employees whose pay records are filed with private non-agricultural establishments having at least ten employees. While establishments were sampled from all non-agricultural and non-governmental industries, so-called "service industries" were not included.

To make the American data comparable with its Japanese counterpart, it was necessary to isolate a subset out of both the S.E.O. and the Parnes tapes. From the files of the S.E.O. Records the following groups were eliminated from the files of the S.E.O. data:

(1) men attending formal schools,

(2) men working only part time,

(3) men who have worked less than 48 weeks during the year prior to the survey year,
(4) workers not employed in private industries,
(5) workers classified as managers, officials, proprietors, service workers, private household workers, farmers, farm managers, farm foremen and farm laborers, and
(6) workers in agriculture, services and public administration.

Similarly records from the following groups were weeded out from the Parnes data:

(1) men who have worked less than 48 weeks durig the year prior to the survey year,
(2) government employees and self-employed,
(3) men working without remuneration,
(4) workers classified as managers, officials, proprietors, service-workers, farm foremen and farm laborers, and
(5) workers in agriculture, services and public administration.

In short, the subset of population selected for our analysis may be characterized as being composed of private male employees employed in non-agricultural, non-service industries who work relatively regularly. The subset thus selected will furnish the basic data to be analyzed in this section and in subsequent sections of disaggregated analysis.

With this introduction to the nature of the data, let us now turn to the examination of results of regression analysis. Discussion in the previous chapter has brought out four points of interest in the aggregate earnings profile: (1) the effect of experience on earnings, (2) non-linearity in the effect of experience, (3) the interactive effects of education and experience, and (4) differences and similarities in the above three points between the United States and Japan. Illumination of these topics will be facilitated by studying the regression results presented in Tables I through VII and appended tables A-1 through A-13.

Let us begin with the results of gross experience (Ex) models. As expected, the results reported in Tables I through IV all reveal that gross experience has a significantly positive effect in raising earnings, both in the United States and Japan.

Results in Tables I and II suggest that the marginal effect of experience relative to that of education is smaller in the United States than in Japan. Table III adds evidence substantiating this point. The marginal effect of education on earnings measured in terms of percentage increases (i.e. regression coefficients of Model 3) does not differ substantially between the United States and Japan (approximately 7 and 8 percent respectively). However, the marginal effect of experience measured by the same model in the United States (approximately 1 percent) is less than half that of Japan (more than 2 percent). These two findings, that gross experience has a significantly

positive effect on earnings in both countries and that the marginal effect of experience is markedly higher in Japan than in the United States, should be emphasized.

Tables II and IV indicate that the non-linearity involved in the effect of experience is well captured by the quadratic form. As expected, a significant negative coefficient was obtained for the squared experience term both in the United States and in Japan, suggesting the concave curve of experience-earnings profile for both countries.

An interesting difference is found between the two countries in the education-experience interaction effects. First, let us look at regression coefficients of the interaction term (*EdEx*) in Table II. For the United States, the interaction term has a large and significantly negative coefficient both for white and non-white workers. The negative interaction effect is consistently found in partial logarithmic forms of Table A-5, too. On the other hand in Japan, the interaction effects observed in Table II are somewhat ambiguous. Similarly, in Table A-3(ii) the result is mixed. This suggests either that the interaction effect itself is ambiguous or that the effect is not captured well by this formulation of simple product term. Also the negative interaction found in the case of the United States is somewhat puzzling in the light of theoretical expectation. Since it is possible that the simple product terms failed to represent interaction effects adequately let us examine a more general formulation which employs a set of dummy variables.

The results of dummy variable models in Table IV are rather surprising. Quite contrary to the earlier finding, very systematic interaction effects were found for Japan, while for the United States the interaction effect appears much less pronounced. In the case of Japan, interaction effects grow larger and become more certain as the level of education increases. In contrast, in the United States the largest and most certain interaction is found for the group with the least educational attainment, namely those who have not completed elementary school. As seen in Table A-5, when the squared experience term is deleted a stronger interaction effect appears for the highly educated group. This is an example that the sensitivity of the coeffcient of interaction term depends on other terms.

On the other hand, the strong and systematic interaction effects remain intact in the case of Japan whether or not the squared experience term is included as shown by Table A-6. These contrasting facts clearly indicate that the interaction effect in the United States is unstable, if it exists at all, whereas the effect is pronounced and systematically related to levels of educational attainment in Japan.

These observations of education-experience interactions and the estimated magnitudes of education coefficients seem to indicate an important role played by education in the United States in stratifying the labor market by differentiating the level of earnings at the beginning of the career. On the

other hand in Japan, as consistently shown in Tables IV and A-6, an interaction effect increases systematically with the level of educational attainment. That is, while workers with low education do not enjoy a marked increase in earnings with experience, those with high educational attainment, while starting low, enjoy a sharp increase in earnings.

These differences are clearly illuminated by the sharply different shapes of the predicted earnings in Diagram III and IV. Indeed as depicted by Diagram VI, differentials in starting wages by educational levels are negligible in Japan, quite contrary to the case of the U.S., where the differentials are large as seen in Diagram V. These differences found between the two countries should be borne in mind.

Let us proceed to discuss results of interval vs. external experience models. As expected from our theoretical considerations, Tables V and VII show that the marginal effect of internal experience ($Ex1$) clearly surpasses that of external experience ($Ex2$), both in the United States and in Japan.

The precision of the coefficients of $Ex2$ in these tables is low. The slope coefficients are small either positive or negative. Insofar as the external experience presumably represents the accumulation of human capital made outside the firm of current employment, this result is puzzling. This curious result may be attributable in part to the wide variation in the nature of the external experiences. However, responsibility for this result may possibly reside in the fact that the data are rather narrowly limited as to relatively older age range.

The analysis of total age range (last columns of Tables V and VII) exhibits that the marginal effects of both of $Ex1$ and $Ex2$ are positive but the former is greater than the latter. Combining this supplementary information obtained from the Japanese data with the fact that the pattern of the U.S. data in the old age range is not remarkably different from its Japanese counterpart, we may not unreasonably expect that if the data of the total age range were analyzed, the marginal effect of external experience would exhibit also a mild positive value.

Non-linearity which is expected to be associated with the effect of experience was not captured well by our quadratic forms as seen in the appended tables A-7 to A-11. This result may perhaps be attributed to the fact that the data are limited to a narrow age range.

Table VI exhibits negative education-experience interactions for white males of the United States and positive but imprecise interactions for Japanese males. As in the case of Table II, the results of models with a set of education dummies will prove to be superior to models with a continuous education variable in capturing the nature of the interactions. Table A-12 indicates that in the United States earnings grow noticeably with internal experience for college graduates but for other groups the trend is not obvious. On the other hand, Table A-13 discloses the clear and systematic trends in

Japan that the interaction effect with internal experience grows greater with the educational level while the interaction with external experience is small or often even negative.

These differential effects of internal and external experiences may be visually illustrated by our simple experiments. We took the input data from the results of regression models which employ both quadratic forms of $Ex1$. $Ex2$ and Ed, and interaction terms of Ed with $Ex1$ and $Ex2$ as independent variables. The American data were obtained from Table A-7 and the Japanese data from Table A-10. Using these regression results as inputs we predicted the shape of earnings profiles for three hypothetical cases. The first is the case in which the worker has spent his entire career in the current firm, namely he has only $Ex1$. The second is the case in which he has spent all his career elsewhere up to the present, in other words he has only $Ex2$. The third case is that the worker has spent half of his career outside and the rest in the current firm, which is calculated by the formula, $Ex = (Ex1 + Ex2) / 2$.

The results of the prediction of American data are presented in Diagram VII. Since the range of the original data was age 45 through 59 we have predicted earnings for the period of 15 years. For college graduates, the internal experience is clearly beneficial and the external experience has a negative effect. For high school graduates the differential impacts are mixed. For elementary school graduates the results are, curiously enough, opposite from those for the college graduates. These results are obtained from the data of white males. The results of non-white males are presented in Appendix Table B-3.

The results of the Japanese case are exhibited in Diagram VIII. In this diagram very systematic trends may be discovered. Internal experience is markedly more contributive in raising earnings than external experience and this differential effect grows greater systematically as the level of education increases. This is a result using the earnings data including special payments. The result of earnings without including special payments is shown in appended Table B-3. In addition the predicted results for the total age range are presented in Diagram IX. Here again a marked differential impact between internal and external experience is observed.

To sum up the discussion, the marginal effect of internal experience is markedly greater than that of external effect both in the United States and in Japan, but external experience appears to be more disadvantageous relative to internal experience in Japan than it is in the United States.

Before turning to the next section a few additional comments are in order. The first relates to the specification error involving an experience-earnings model which has a single independent variable, Ex, and the second concerns the difference between the earnings of white and non-white males in the United States. The third pertains to the difference between earnings with and without special payments in Japan.

When earnings are regressed on experience only the slope coefficient is low as is its precision. When the variable of education is added, the coefficient of experience takes a markedly higher value and its precision increases, as may be seen in the results of Tables A-1 and A-2. This case evidently shows that the model with the experience variable suffers from a bias due to specification error. The negative auxiliary correlation between experience and education coupled with a positive slope coefficient which education has with respect to earnings may have caused a negative bias in the slope coefficient of experience. Although our major interest is in the effect of experience, we rejected the model which includes experience as a sole independent variable in view of this specification error.

There are consistent differentials in favor of white males in almost every respect of earnings equations between white and non-white males. As seen in Tables I through VII, marginal effects of experience and education on earnings are 50 to 100 percent higher for white than for non-white males. The differential is especially pronounced in terms of th effect of education.

In Japan the difference between contracted cash earnings alone and earnings which include special payments such as bi-annual bonuses is also quite consistent. The results of Tables I through VII appear to indicate that special payments perform a consistent role in widening differentials in favor of those with higher education and longer internal experience.

Table I

Regression Results of Aggregate Earnings Equations, Model 1, All Industries, Males of Total Age Range, The United States (The S.E.O. Data) 1966, Japan 1967. Dependent Variable is Hourly Earnings in U.S. Cents

	THE UNITED STATES		JAPAN	
	WHITE	NON-WHITE	HRYB	HRY
Ex	3.29 (20.38)	2.70 (13.65)	1.75 (8.26)	1.27 (9.27)
Ed	26.16 (37.60)	13.65 (17.66)	7.59 (6.77)	4.85 (6.67)
CONST.	−14.06 (−1.43)	54.41 (5.13)	−39.56 (−2.85)	−15.76 (−1.75)
$\bar{R}^2$	.210	.134	.491	.719
N	5416	2120	91 Cells	91 Cells

Notes: (1) Figures in parentheses are t-ratios.
(2) Const. is an abbreviation of constant term, $\bar{R}^2$ stands for the coefficient of determination adjusted for the degree of freedom, and N denotes sample size.
(3) The Japanese data are available in the form of 91 cells. In order to minimize possible biases the technique of weighted regression was used for the Japanese data. The U.S. data were analyzed by the unweighted regression method.
(4) HRYB stands for hourly earnings including hourly equivalent of special payments such as bonuses, and HRY stands for hourly rate of contracted cash earnings without including special payments.

Table II

Regression Results of Aggregate Earnings Equations, Model 2, All Industries, Males of Total Age Range, The United States (The S.E.O. Data) 1966, Japan 1967. Dependent Variable is Hourly Earnings in U.S. Cents

	THE UNITED STATES		JAPAN	
	WHITE	NON-WHITE	HRYB	HRY
Ex	19.79 (18.52)	11.30 (8.92)	4.44 (3.98)	3.39 (5.06)
Ex^2	−.22 (−16.98)	−.11 (−6.69)	−.08 (−5.75)	−.056 (−7.11)
Ed	39.22 (24.69)	23.67 (12.19)	6.75 (4.57)	4.41 (4.96)
EdEx	−.56 (−10.01)	−.37 (−5.76)	−.05 (.70)	.026 (.59)
CONST.	−251.8 (−11.80)	−92.38 (−3.69)	−52.58 (−2.89)	−27.46 (−2.50)
$\bar{R}^2$	.250	.152	.804	.847
N	5416	2120	91 Cells	91 Cells

Note: Notations are the same as in Table I.

Table III

Regression Results of Aggregate Earnings Equations, Model 3, All Industries, Males of Total Age Range, The United States (The S.E.O. Data) 1966, Japan 1967. Dependent Variable is Hourly Earnings in U.S. Cents

	THE UNITED STATES		JAPAN	
	WHITE	NON-WHITE	LNHRYB	LNHRY
Ex.	.009 (20.79)	.013 (14.01)	.025 (9.59)	.022 (10.42)
Ed	.074 (36.67)	.063 (17.98)	.093 (6.81)	.075 (6.59)
CONST.	4.73 (166.3)	4.52 (94.39)	2.77 (16.40)	2.81 (19.81)
$\bar{R}^2$	.204	.138	.729	.749
N	5416	2120	91 Cells	91 Cells

Notes: (1) LN stands for the fact that the dependent variable (straight hourly earnings of the United States, Y, hourly equivalent of contracted cash earnings HRY, or hourly equivalent of earnings including special payments such as bi-annual bonuses) is transformed in terms of natural logarithm.
(2) Other notations are the same as in Table I.

Table IV

Regression Results of Aggregate Earnings Equations, Model 4, All Industries, Males of All Age Range, The United States (The S.E.O. Data) 1966, Japan 1967. Dependent Variable is Hourly Earnings in U.S. Cents

	THE UNITED STATES			JAPAN	
	WHITE	NON-WHITE		HRYB	HRY
Ex	12.12 (16.50)	6.47 (8.11)	Ex	4.57 (8.42)	3.40 (10.60)
Ex^2	−.19 (−14.80)	−.09 (−5.94)	Ex^2	−.076 (−6.86)	−.056 (−8.58)
LE	−118.8 (−6.65)	−94.90 (−6.11)	H	10.86 (1.61)	6.38 (1.61)
HM	71.68 (7.39)	46.70 (4.20)	J	29.76 (1.12)	18.47 (1.18)
CM	237.9 (14.42)	161.7 (3.76)	C	24.72 (2.28)	17.31 (2.70)
LEEx	1.75 (3.31)	1.55 (3.09)	HEx	.58 (1.63)	.38 (1.81)
HMEx	−.52 (−1.38)	.12 (.23)	JEx	1.22 (1.12)	.79 (1.23)
CMEx	.36 (.47)	.98 (.42)	CEx	2.88 (3.63)	1.73 (3.70)
CONST.	158.9 (15.34)	150.2 (14.63)	CONST.	14.35 (2.34)	16.61 (4.58)
$\bar{R}^2$	.243	.147	$\bar{R}^2$	.852	.888
N	5416	2120	N	91 Cells	91 Cells

Notes: (1) Education dummies correspond to years of schooling as follows:
The U.S.: LE=0 to 7 years, Base Group = 8 to 11, HM = 12 to 15, and CM = 16 to 20
Japan: Base Group = 9 years, H=12, J=14, and C=16.
(2) Notations other than education dummies are the same as in Model I.

Table V

Regression Results of Aggregate Earnings Equations, Model 5, All Industries, Males of Old Age Range, The United States (The Parnes Data) 1966, Japan 1967. Dependent Variable is Hourly Earnings in U.S. Cents

	THE UNITED STATES		JAPAN	
	WHITE	NON-WHITE	HRY	HRYB
Age Range	45 Through 59	45 Through 59	45 Through 59	Total Age Range
Ex1	2.73 (3.22)	1.45 (1.56)	1.25 (10.64)	4.93 (18.95)
Ex2	.66 (.77)	−1.18 (−1.26)	−.159 (−1.52)	.058 (.34)
Ed	20.40 (13.82)	4.74 (3.42)	5.86 (20.18)	5.70 (8.79)
CONST.	83.33 (2.14)	209.6 (5.41)	−1.20 (−.22)	−30.89 (−3.91)
$\bar{R}^2$	.171	.102	.931	.913
N	1513	553	192 Cells	91 Cells

Notes: (1) Ex1 stands for internal experience and Ex2 is external experience.
(2) The U.S. data (the Parnes Data) cover age range of 45 through 59. The most closely comparable age range available from the grouped Japanese data is 40 through 59. The data of this age range were obtained from the table of earnings distribution cross-classified by age and length of service (or Ex1). No information of special payments is reported analysis of this age range is confined to HRY only. The results of analysis of total age range are added in the last column as supplementary information.
(3) Other notations are the same as in Table I.

Table VI

Regression Results of Aggregate Earnings Equations, Model 6 (Modified), All Industries, Old Age Males, The United States (The Parnes Data) 1966, Japan 1967. Dependent Variable is Hourly Earnings in U.S. Cents

	THE UNITED STATES		JAPAN	
	WHITE	NON-WHITE	HRY	HRYB
Age Range	45 Through 59	45 Through 59	45 Through 59	Total Age Range
Ex1	8.43 (3.26)	.82 (.39)	.276 (.47)	−4.19 (−4.78)
Ex2	12.07 (4.82)	−.90 (−.43)	−.165 (−.32)	1.78 (4.29)
Ed	51.74 (6.44)	4.24 (.50)	4.53 (3.07)	.098 (.13)
EdEx1	−.58 (−2.42)	.10 (.39)	.098 (1.71)	.87 (10.63)
EdEx2	−1.17 (−4.96)	−.03 (−.12)	.001 (.018)	−.17 (−4.20)
CONST.	−232.2 (−2.58)	210.3 (2.78)	11.85 (.76)	28.78 (3.40)
$\bar{R}^2$	.193	.100	.934	.963
N	1513	553	192 Cells	91 Cells

Notes: (1) EdEx1, EdEx2 are interaction terms between education and internal experience, and external experience, respectively.
(2) Other notations are the same in Table V.

Table VII

Regression Results of Aggregate Earnings Equations, Model 7,
All Industries, Old Age Males,
The United States (The Parnes Data) 1966, Japan 1967.
Dependent Variable is Natural Logarithm of Hourly Earnings in U.S. Cents

	THE UNITED STATES (LNY)		JAPAN	
	WHITE	NON-WHITE	LNHRY	LNHRYB
Age Range	45 Through 59	45 Through 59	45 Through 59	Total Age Range
Ex1	.007 (2.94)	.007 (1.75)	.015 (10.24)	.063 (19.97)
Ex2	−.0007 (−.30)	−.006 (−1.44)	−.005 (−3.59)	.004 (1.97)
Ed	.053 (12.90)	.023 (3.70)	.069 (18.69)	.070 (8.85)
CONST.	5.13 (47.58)	5.25 (30.05)	3.43 (49.85)	2.88 (29.92)
$\bar{R}^2$	.180	.125	.939	.922
N	1513	553	192 Cells	91 Cells

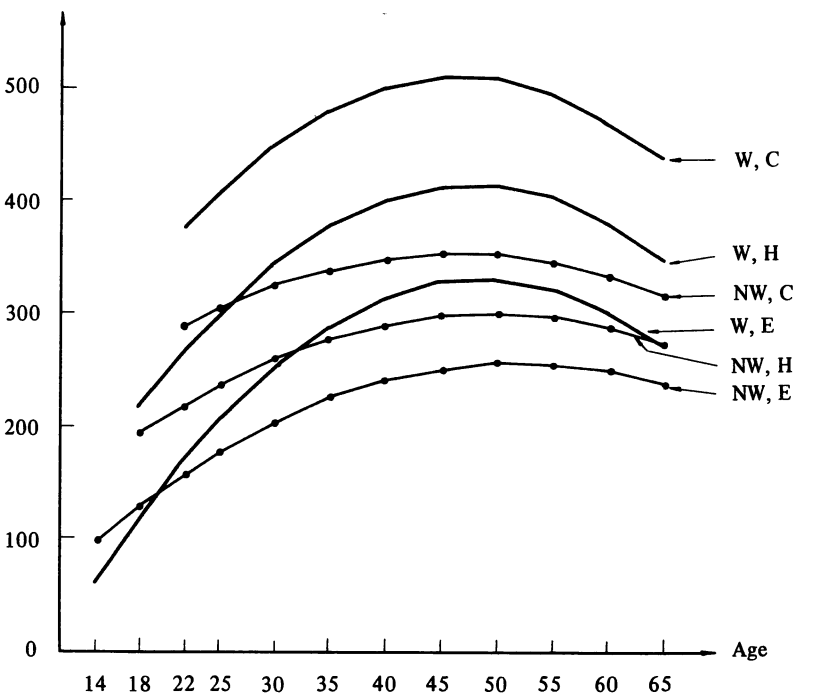
Note: Notations are the same as in Table V.

Diagram III

Aggregate Earnings Profiles, The United States, All Industries, White and Non-White Males. Earnings are Predicted on the Basis of Regression Results:

White Males: $Y = -251.8 + 19.79Ex - .22Ex^2 + 39.22Ed - 5.6EdEx \quad \bar{R}^2 = .152$
$(-11.80)\ (18.52)\quad (-16.98)\ (24.69)\ (-10.01)$

Non-White Males: $Y = -92.38 + 11.30Ex - .11Ex^2 + 23.67Ed - .37EdEx \quad \bar{R}^2 = .152$
$(-3.69)\quad (8.92)\quad (-6.69)\quad (12.19)\ (-5.76)$

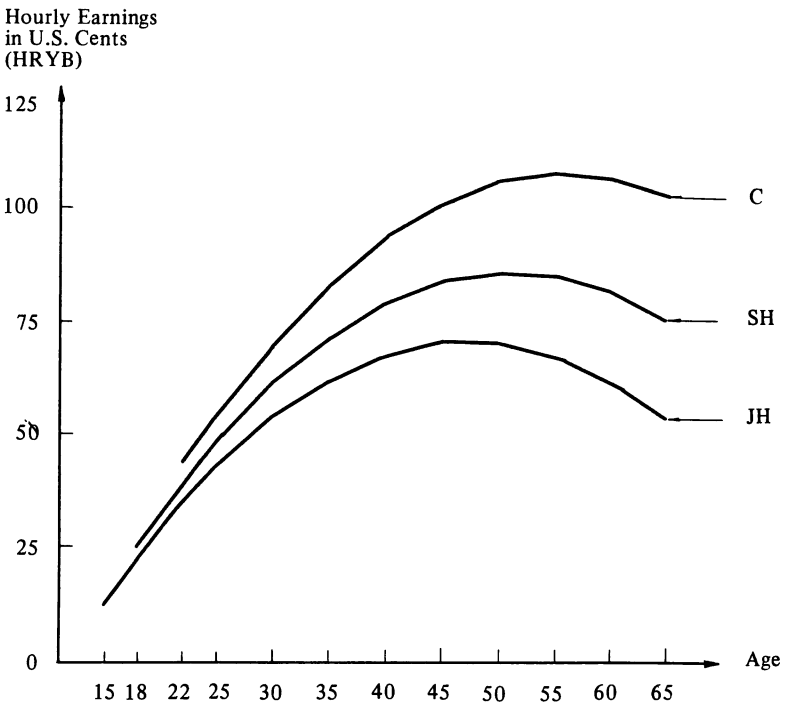


Notes: (1) W and NW stand for White and Non-white males respectively. C, H and E represent College, High-school and Elementary school graduates corresponding to 16, 12 and 8 years of schooling, respectively.
(2) The predicted earnings data for these profiles are presented in Appendix Table B-1.

Diagram IV

Aggregate Earnings Profiles, Japan, All Industries
Earnings are Predicted on the Basis of Regression Results:

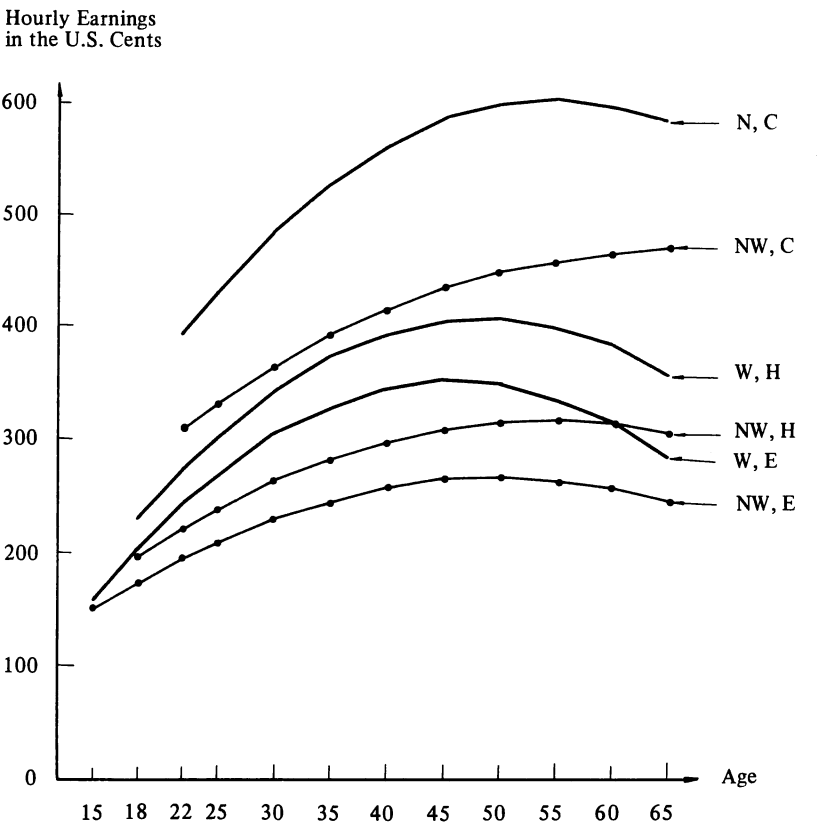
$$Y = -52.58 + 4.44Ex - .08Ex^2 + 6.75Ed - .05EdEx \quad \bar{R}^2 = .804$$
$$(-2.89) \quad (3.98) \quad (-5.75) \quad (4.57) \quad (.70)$$



Notes: (1) Dependent variable is total hourly earnings including special payments, namely HRYB.
(2) C, SH and JH represent College, Senior-high, Junior-high school graduates corresponding to 16, 12 and 9 years of education, respectively.
(3) The predicted earnings data for these profiles are presented in Appendix Table B-1.

Diagram V

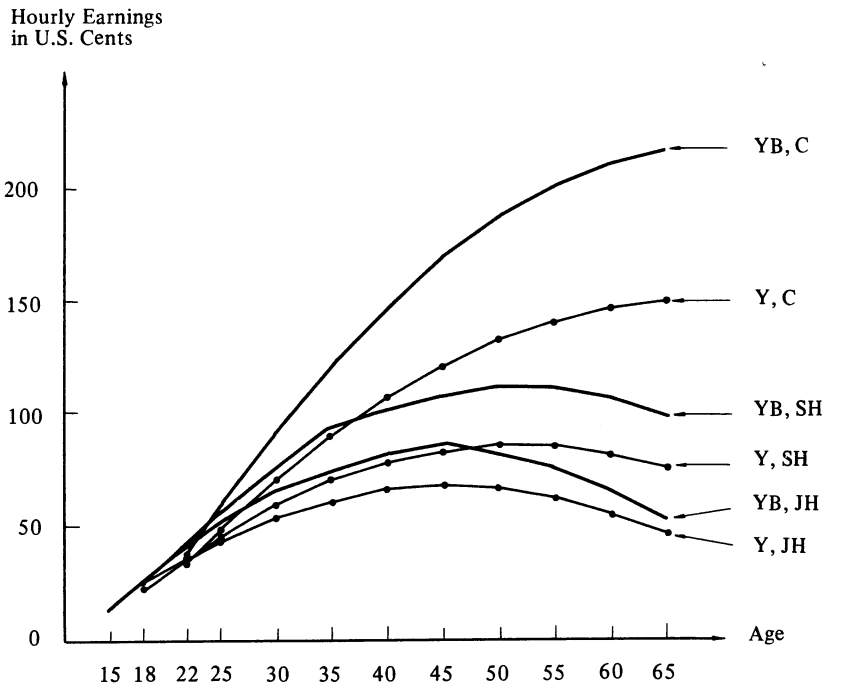
Aggregate Earnings Profiles, The United States, All Industries, White and Non-White Males. Earnings are Predicted on Basis of Regression Results Reported in Table IV of This Chapter



Notes: (1) Notations are the same as in Diagram III.
(2) The predicted earnings data for the profiles are presented in Appendix Table B-2.

Diagram VI

Aggregate Earnings Profiles, Japan, All Industries, Earnings are Predicted on The Basis of Regression Results Reported in Table IV of This Chapter



Notes: (1) Y represents earnings without special payments and YB represents earnings including special payments such as bonuses. Other notations are the same as in Diagram IV.
(2) The predicted earnings data for these profiles are presented in Appendix Table B-2.

Diagram VII

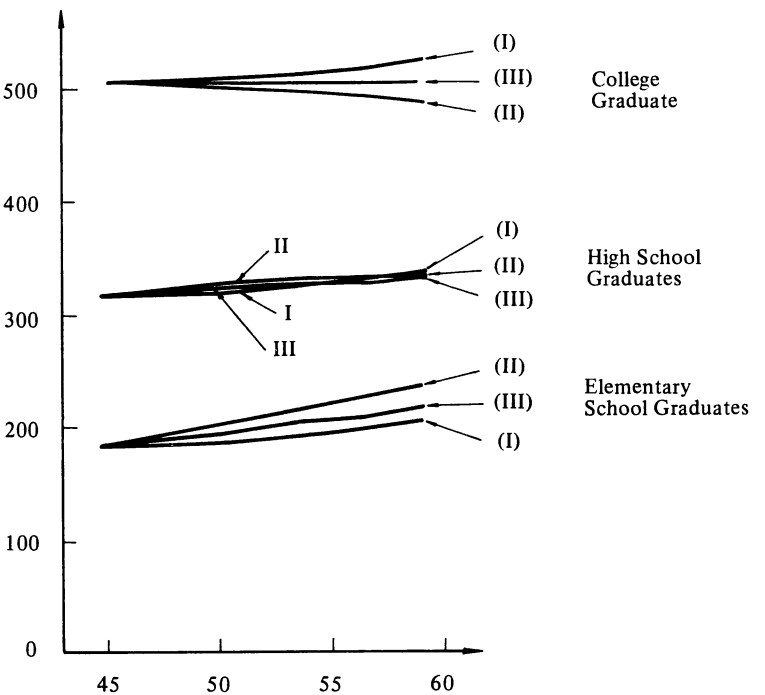
Simulation Results of Impacts of Internal VS. External Experience, The United States, White Males, The Parnes Data, Age 45 to 59

Case (I) is a worker with internal experience only.
Case (II) is a worker with external experience only.
Case (III) is a worker with half and half of internal and external experience.

Earnings are predicted on the basis of regression results:

$$Y = 71.56 + .92Ex1 + .08Ex1^2 + 9.61Ex^2 - 0.6Ex2^2 + .56Ed$$
$$(.64) \quad (.31) \quad (2.11) \quad (2.53) \quad (-1.50) \quad (0.5)$$

$$+1.66Ed^2 - .05EdEx1 - .62EdEx2 \quad \bar{R}^2 = 214$$
$$(5.91) \quad (-.20) \quad (-2.27)$$



Note: The predicted earnings data are presented in Appendix Table B-3.

Diagram VIII

Simulation Results of Impacts of Internal VS. External Experience, Japan, Males of Age 40 to 59. Manufacturing Industries

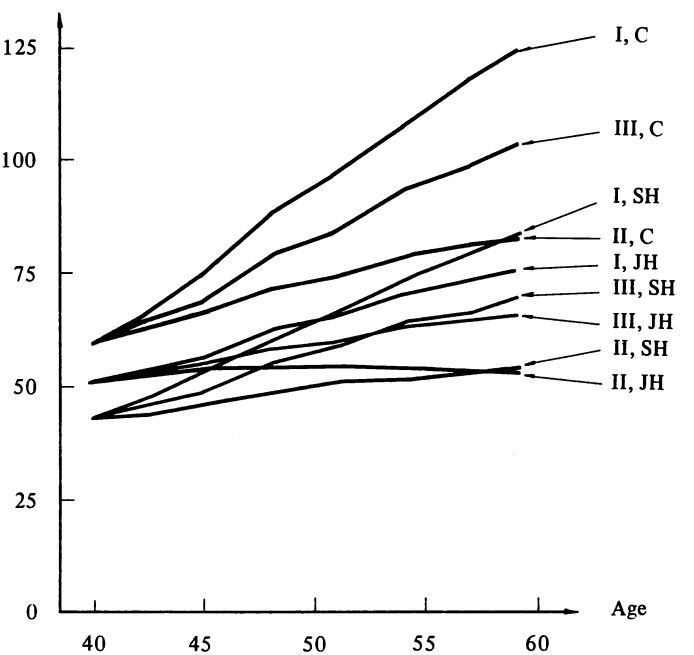
Case (I) is a worker with internal experience only.
Case (II) is a worker with external experience only.
Case (III) is a worker with half and half of internal and external experience.

Earnings are predicted on the basis of regression results:

$$Y = 186.7 - 1.37Ex1 - .002Ex1^2 - 1.17Ex2^2 - .017Ex2^2$$
$$(6.24) \quad (-2.08) \quad (-.24) \quad (-1.83) \quad (-3.25)$$

$$- 24.02Ed + 1.10\,Ed^2 + .30EdEx1 + .17$$
$$(-5.60) \quad (7.02) \quad (4.81) \quad (2.98)$$

$$\bar{R}^2 = .973$$



Notes: (1) The predicted earnings data are presented in Appendix Table B-3.
(2) The other notations are the same as in Diagram IV.

Diagram IX

Simulation Results of Impacts of Internal VS. External Experience, Japan, Males of Total Age Range

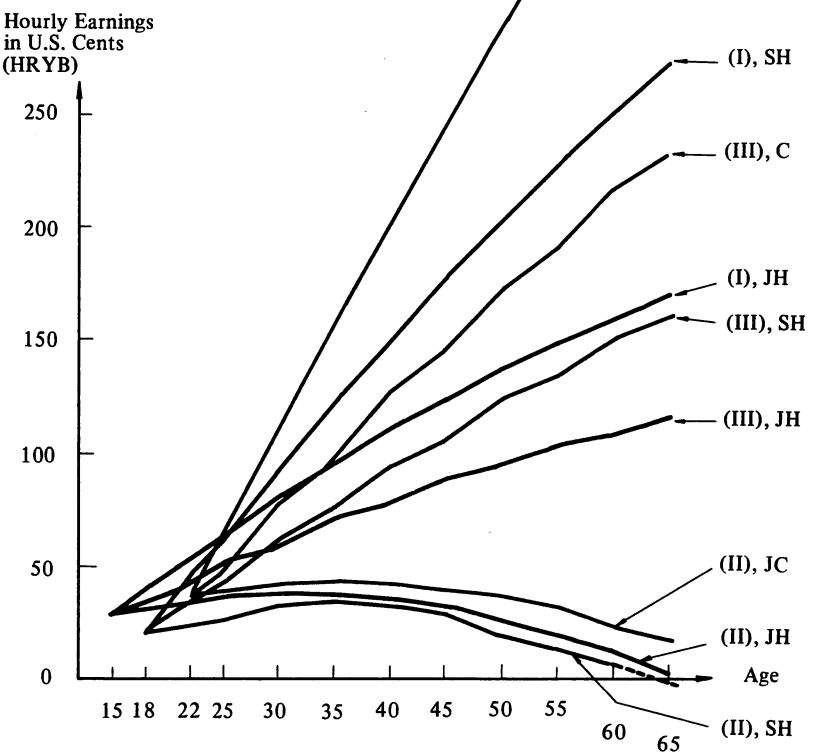
Case (I): A worker has internal experience only.
Case (II): A Worker has external experience only.
Case (III): A worker has half and half of internal and external experinece.

Earnings are predicted on the basis of following regression results:

$$Y = \underset{(9.36)}{151.1} - \underset{(-8.43)}{21.72Ed} + \underset{(3.97)}{.91Ed^2} - \underset{(-4.36)}{3.88Ex1} - \underset{(-.76)}{.017Ex1^2}$$

$$+ \underset{(2.20)}{1.24Ex2} - \underset{(-4.51)}{.032Ex2^2} + \underset{(15.41)}{.84EdEx1} - \underset{(-.54)}{.021EdEx^2}$$

$$\bar{R}^2 = .985$$



Notes: (1) Notations are the same as Diagram VIII.
(2) The predicted earnings date are presented in Appendix Table B-3.

2. Disaggregated Earnings Profiles of Blue-Collar and White-Collar Occupations

The population of workers whose earnings are studied in this section of disaggregated analysis is confined to manufacturing industries. This restriction was necessary in order to maintain comparability between the American and Japanese data sets. Since the earnings data separated into blue and white-collar occupations were not available from all industries of the Japanese data, we were obliged to use the data of production workers and non-manual office workers within manufacturing industries. Correspondingly, the manufacturing industry portion of the American data was carved out for our analysis.

The major focus of this section is the difference between earnings profiles of blue-collar and white-collar occupations. Examinations of the effects of expereience, non-linearity, and interaction is made according to these two occupational classifications. In addition, cross-national comparison is made of the patterns of inter-occupational differentials.

First, let us study the results of gross experience models. Tables VIII, IX and X disclosed that the marginal effects of experience and education on earnings differ conspicuously between blue-collar and white-collar occupations. As expected, the effects are much higher for white-collar than for blue-collar occupations.

It is intreresting to note that these patterns of inter-occupational difference appear to be remarkably similar in the United States and Japan. Table VIII shows that for white-collar occupations the marginal effect of gross experience (Ex) on earnings is 2.3 times greater than that of blue-collar occupations in the United States. The comparable ratio in the case of Japan is about 2.0. Inter-occupational difference in the marginal effect of education on earnings exhibits a similar pattern. In the United States, the marginal effect of education is 2.3 times larger in white-collar occupations than in blue-collar occupations, and 2.7 in Japan.

This similarity in the pattern of inter-occupational differentials seems strengthened when account is taken of the non-linearity in the effect of experience. Table IX reveals that the patterns of differentials are surprisingly similar between the two countries. Differential ratios in the marginal effect of Ex are 1.2 for the United States and 1.1 for Japan, that of squared term of Ex is 1.5 for both countries, and that of education is 1.4 for the United States and 1.2 for Japan.

In view of the differences in the nature of data sets and possible measurement errors, it is somewhat astonishing to find this high degree of similarity in the pattern of inter-occupational differentials between the United States and Japan. This findings, that the earnings profiles of blue and white-collar occupations do show a remarkably similar pattern of differentials not only in

terms of their relative positions but also in their shapes, deserves special emphasis. This similarity is also found in the results of Table X.

As seen in Table IX, the non-linearity in the effect of experience is well represented by a quadratic form. The result indicates that the curvature of experience-earnings profile is much steeper for white-collar than for blue-collar occupations.

Interaction effects between education and experience all turned out to be negative as shown by Table IX except for the case of Japanese white collar workers who seem to enjoy a pronounced positive interaction effect. A review of more results presented in appended Tables A-14 and A-15 confirms this finding. That is, while the interaction term yields a negative effect, strong or weak, for both blue and white-collar American workers and for Japanese blue-collar workers, a positive interaction effect stands out for Japanese white-collar workers, even for earnings without special payments. This seems to imply that Japanese white collar workers with higher education either enjoy a steep rise in earnings with experience and/or start their career at a very low rate of earnings. Indeed, the predicted earnings profiles in Diagram XI show that the white-collar workers with higher education receive steeply rising earnings with experience while starting earnings are as low as indistinguishable from those of the low educated blue-collar workers.

Upon scrutiny of the results of Tables IX, A-14 and A-15, we find that among the negative interaction effects the most pronounced is associated with American blue collar workers. The negative effect indicates that the relatively highly educated start their career at a rather high level of earnings but thier earnings streams are not as steep as those of low wage workers with low educational attainment. This pattern may be clearly observed in the predicted earnings profiles of Diagram X.

Let us now turn to examine the results of internal vs. external experience models. Regression coefficients reported in Tables XI and XII and in appended Tables A-16 through A-20 show considerable similarities between the United States and Japan in the pattern of inter-occupational differentials.

Similarities are found in the facts that while the marginal effect of internal experience is positive both for blue-collar and white-collar occupation, the effect for blue-collar is much smaller than for white-collar, and that the marginal effect of external experience is negative for blue-collar while positive for white-collar occupation. It should be added quickly that the results concerning external experience are not very reliable because of the low precision of estimates. This instability shows up partially in the mixed results in Table XII.

Another striking similarity may be found in the effect of education: in each country the marginal effect of education is higher by approximately 50 percent for white-collar than for blue-collar workers. This result may be attributed to the limited range of educational attainment of blue-collar

workers.

The results of interaction effects are reported in appended Tables A-16 through A-20. The interaction between education and internal experience is negative for blue-collar but positive for white-collar workers both in the United States (white males) and Japan. The interaction with expernal experience produces mixed results which seem to have been caused in part by the narrow age range of the data. The supplementary analysis of total age range of the Japanese data indicates that for white-collar workers the interaction with internal experience is much more effective in raising earnings than is the interaction with external experience, though both types of interactions have positive effects. The results for blue collar workers are indecisive, for which may be caused in part by the limited range of the education variable. In sum, although the results seem to have been disturbed and made ambiguous, probably by the restrictive nature of the data, it may be safe to say that positive interaction effects of education and internal experience show up more clearly for white-collar workers than for blue-collar workers, especially in the case of Japan.

Table VIII

Regression Results of Blue-Collar VS. White-Collar Earnings Equations, Model 1, Males, Total Age Range, Manufacturing Industries, The United States (The S.E.O. Data) 1966, Japan 1967. Dependent Variable is Hourly Earnings in U.S. Cents

	THE UNITED STATES		JAPAN	
	WHITE		HRYB	
	Blue-Collar	White-Collar	Blue-Collar	White-Collar
Ex	2.56 (13.79)	5.91 (9.58)	1.09 (5.59)	2.16 (8.49)
Ed	17.97 (19.64)	41.37 (16.10)	2.78 (1.54)	7.69 (6.32)
CONST.	79.66 (6.63)	−202.7 (−4.99)	14.49 (.76)	−45.65 (−2.65)
$\bar{R}^2$	.160	.234	.607	.683
N	2195	912	50 Cells	91 Cells

Note: Notations are the same as in Table I.

Table IX

Regression Results of Blue-Collars VS. White-Collar Earnings Equations, Model 2, Males, Total Age Range, Manufacturing Industries, The United States (The S.E.O. Data) 1966, Japan 1967. Dependent Variable is Hourly Earnings in U.S. Cents

	THE UNITED STATES		JAPAN	
	WHITE		HRYB	
	Blue-Collar	White-Collar	Blue-Collar	White-Collar
Ex	16.34 (12.18)	19.76 (4.43)	4.43 (2.80)	4.65 (3.53)
Ex^2	−.179 (−11.87)	−.265 (−5.11)	−.066 (−6.08)	−.101 (−7.02)
Ed	30.53 (13.43)	41.82 (7.41)	4.14 (1.88)	5.13 (3.29)
EdEx	−.495 (−6.56)	−.132 (−.59)	−.054 (−.37)	.168 (2.06)
CONST.	−131.8 (−4.61)	−312.7 (−3.67)	−17.61 (−.77)	−45.56 (−2.11)
$\bar{R}^2$	.210	.256	.801	.845
N	2195	912	50 Cells	91 Cells

Note: Notations are the same as in Tables VIII and I.

Table X

Regression Results of Blue-Collar VS. White Collar Earnings Equations, Model 3, Males, All Age Range, Manufacturing Industries, The United States (The S.E.O. Data) 1966, Japan 1967, Dependent Variable is Natural Logarithm of Hourly Earnings in U.S. Cents

	THE UNITED STATES		JAPAN	
	WHITE		HRYB	
	Blue-Collar	White-Collar	Blue-Collar	White-Collar
Ex	.009 (13.98)	.012 (11.14)	.019 (5.99)	.026 (9.84)
Ed	.061 (20.21)	.089 (19.52)	.053 (1.78)	.087 (6.91)
CONST.	4.89 (122.8)	4.63 (64.47)	3.19 (10.17)	2.85 (15.95)
$\bar{R}^2$	.167	.308	.636	.731
N	2195	912	50 Cells	91 Cells

Note: Notations are the same as in Tables VIII and I.

Table XI

Regression Results of Blue-Collar VS. White-Collar Earnings Equations, Model 5, Older Age Males, Manufacturing Industries, The United States (The Parnes Data) 1966, Japan 1967. Dependent Variable is Hourly Earnings in U.S. Cents

	THE UNITED STATES (WHITE)		JAPAN (HRY)	
Age Range	45 Through 59		40 Through 59	
	Blue-Collar	White-Collar	Blue-Collar	White-Collar
Ex1	1.31 (1.51)	6.69 (1.82)	1.02 (9.34)	1.85 (10.50)
Ex2	−.68 (−.79)	3.85 (.95)	−.447 (−4.55)	.095 (.59)
Ed	10.30 (6.12)	46.64 (6.79)	1.36 (2.63)	6.33 (16.64)
CONST.	200.9 (4.92)	−277.2 (−1.48)	50.04 (7.72)	−13.09 (−1.59)
$\bar{R}^2$	.126	.200	.981	.962
N	664	247	34 Cells	63 Cells

Note: Notations are the same as in Tables VIII, V and I.

Table XII

Regression Results of Blue-Collar VS. White-Collar Earnings Equations, Model 7, Older Age Males, Manufacturing Industries, The United States (The Parnes Data) 1966, Japan 1967. Dependent Variable is Natural Logarithm of Hourly Earnings in U.S. Cents

	THE UNITES STATES (WHITE)		JAPAN (HRY)	
Age Range	45 Through 59		40 Through 59	
	Blue-Collar	White-Collar	Blue-Collar	White-Collar
Ex1	.0044 (1.54)	.0089 (1.74)	.014 (6.81)	.019 (9.71)
Ex2	−.003 (−1.06)	.003 (.47)	−.008 (−4.22)	−.002 (−1.29)
Ed	.037 (6.71)	.128 (2.37)	.019 (1.94)	.067 (15.57)
CONST.	5.31 (39.22)	4.16 (5.34)	3.98 (31.79)	3.43 (36.60)
$\bar{R}^2$	.155	.237	.97	.966
N	664	247	34 Cells	63 Cells

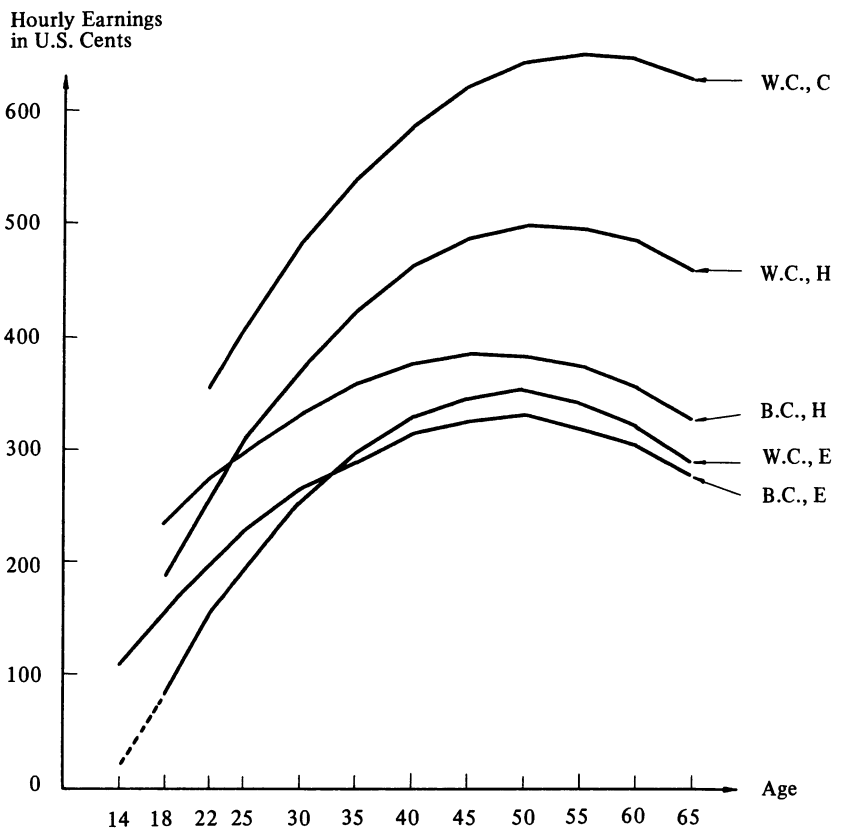
Note: Notations are the same as in Tables VIII, V and I.

Diagram X

Blue-collar VS. White-collar Earnings Profiles, The United States, Manufacturing Industries, White Males, Earnings are Predicted on The Basis of Regression Results:

Blue-Collar: $Y = -131.8 + 16.34Ex - .179Ex^2 + 30.53Ed - .495EdEx \quad \bar{R}^2 = .210$
(−4.61) (12.18) (−11.87) (13.43) (−6.56)

White-Collar: $Y = -312.7 + 19.76Ex - .265Ex^2 + 41.82Ed - .132EdEx \quad \bar{R}^2 = .256$
(−3.67) (4.43) (−5.11) (7.41) (−. 59)



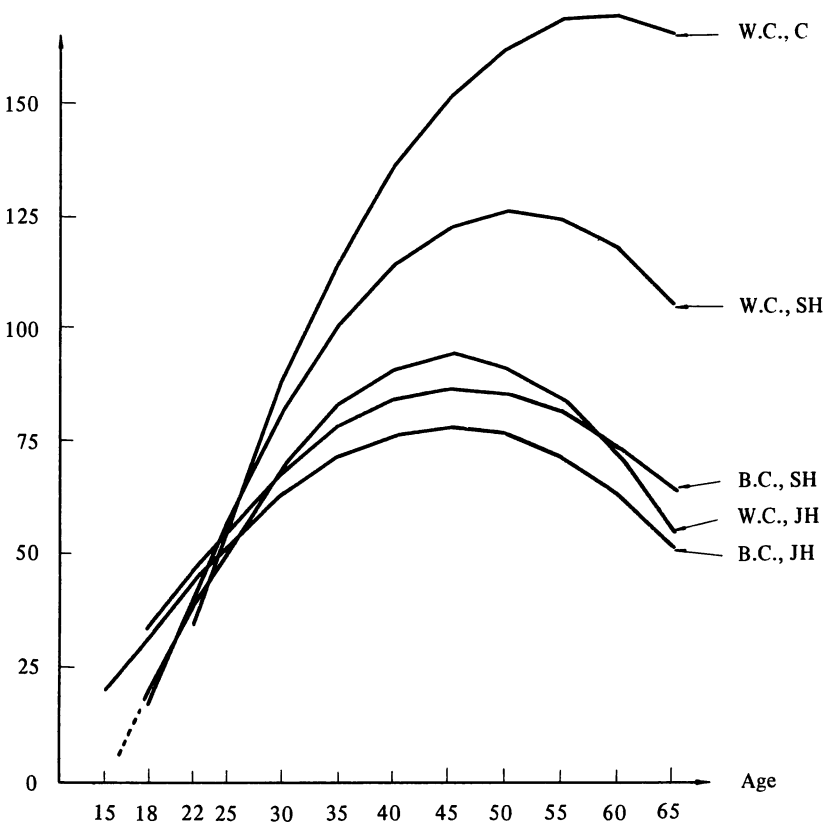
Notes: (1) B.C. and W.C. stand for Blue-collar and White-collar occupations respectively.
(2) The predicted earnings data are presented in Appendix Table B-4.

Diagram XI

Blue-Collar VS. White-Collar Earnings Profiles, Japan, Manufacturing Industries, Earnings are Predicted on The Basis of Regression Results:

Blue-Collar: $Y = -17.61 + 4.43Ex - .066Ex^2 + 4.41Ed - .054EdEx \quad \bar{R}^2 = .801$
(−.77) (2.80) (−6.08) (1.88) (−.37)

White-Collar: $Y = -45.56 + 4.65Ex - .101Ex^2 + 5.13Ed + .168EdEx \quad \bar{R}^2 = .845$
(−2.11) (3.53) (−7.02) (3.29) (2.06)



Notes: (1) B.C. and W.C. stand for Blue-collar and White-collar occupations, respectively.
(2) The predicted earnings date are presented in Appendix Table B-4.

3. Disaggregated Earnings Profiles of Large-Scale and Small-Scale Industries

As discussed in Chapter 3, our basic interest in specifying earnings models for large-scale and small-scale industry segments was to discover the role of the size of establishment in differentiating earnings profiles.

Since information on the size of a firm or an establishement is not available directly from the American data sets, I have constructed the comparable data sets between the two countries by means of segmenting manufacturing industries into two blocks: large-scale industry block which consists of industries in which relatively larger proportion of workers are employed in large establishments (with 1,000 employees and more) and small-scale industry block which is composed of industries in which relatively smaller proportion of workers are employed in large establishements. The names and associated characteristics of manufacturing industries which compose these two segments are listed in Appendix Tables C-1 and C-2.

Given our interest in the effect of size of an establishment, one preliminary check was needed to see whether or not the nature of our data sets is agreeable for our purposes. In other words, by analyzing our data segmented on the basis of the type of industry, are we analyzing reasonably closely the issue of the effect of the size of an establishment, which is the essential target of our analysis? A cross examination of properties of our segmented Japanese data which will be used for analysis (Appendix Table A-22) with the data classified directly by the size of an establishment (Appendix Tables A-29, A-30, and A-31) indicates that our data by the type of industry are reasonably close approximation of the earnings data classified directly by the size of an establishment. Therefore, it may not be unreasonable to expect that the American data segmented according to the type of industry also approximate the earnings data which would be obtained if classified directly by the size of an establishment. Thus, although the data are segmented actually by the type of industry it still may not be unreasonable to speculate about the role of the size of an establishment on the basis of our findings.

Tables XIII and XV reveal a notable dissimilarity between the United States and Japan in terms of inter-scale differential in the effect of experience on earnings. While the slope coefficients of experience in the United States are 3.9 and 3.6 cents per hour respectively for large-scale and small-scale industries, the comparable figures in Japan are 3.7 and 1.8 cents. That is, while the marginal effect of experience is approximately of the same magnitude between large-scale and small-scale industries in the United States, it is more than twice as large in large-scale industries as it is in small-scale industries in Japan.

The same conspicuous dissimilarity is confirmed by the partial logarithmic equation of Table XV. The marginal effect of experience is approximately

1 percent both for large and small-scale industries in the United States; in Japan, in contrast, it is 4.5 percent in large-scale industries and only 2.5 percent in small-scale industries.

This conspicuous dissimilarity is depicted clearly by the predicted earnings profiles presented in Diagrams XII through XV. As seen in Diagram XII, in the United States, the inter-scale differential exists consistently throughout the entire span of workers' careers. The magnitude of the differential is greater among non-white males than among white males as shown by Diagram XIII. In addition, the earnings profiles of non-white males are notably flat. These low slopes might be a reflection of a cohort effect which represents the appreciable improvements in the quality of education and market opportunities for the younger cohorts. In Japan, in contrast, both Diagrams XIV and XV exhibit a marked tendency that the inter-scale differential is very small or non-existent during the early phase of the occupational career but expands sharply as experience increases.

Another notable dissimilarity between the United States and Japan is the inter-scale differential in the impacts of internal and external experiences on earnings. In the United States, marginal effects of both internal and external experiences in raising earnings are markedly greater in large-scale industries than in small-scale industries. Especially, the effect of external experience for workers in small-scale industries is negative. In Japan, the pattern of marginal effects of internal and external experiences is quite similar between the large and small scale industry blocks; namely, the effect of internal experience is positive and that of external experience is negative. This dissimilarity between the two countries is consistently found in the results of both tables XVI and XVII.

Table XIII

Regression Results of Large-Scale VS. Small-Scale Industry Earnings Equations, Model 1, Males, Total Age Range, Manufacturing Industries. The United States (The S.E.O. Data) 1966, Japan 1967. Dependent Variable is Hourly Earnings in U.S. Cents

	THE UNITES STATES A(WHITE)		JAPAN (HRYB)	
Industry Block	Large-Scale Industries	Small-Scale Industries	Large-Scale Industries	Small-Scale Industries
Ex	3.87 (14.22)	3.57 (9.42)	3.65 (16.18)	1.81 (7.00)
Ed	31.77 (28.40)	30.19 (18.25)	9.83 (19.05)	7.50 (11.60)
CONST.	−65.77 (−3.94)	−63.66 (−2.81)	−90.95 (−10.83)	−49.79 (−4.85)
$\bar{R}^2$	.287	.226	.925	.846
N	2016	1152	66 Cells	54 Cells
$\bar{Y}$	383	330	72.7	58.7

Notes: (1) $\bar{Y}$ denotes the mean value of dependent variable, namely earnings.
(2) Other notations are the same as in Table I.

Table XIV

Regression Results of Large-Scale VS. Small-Scale Industry Earnings Equations, Model 2 (Japanese Model Modified), Males, Total Age Range, Manufacturing Industries, The United States (The S.E.O. Data), 1966, Japan 1967. Dependent Variable is Hourly Earnings in U.S. Cents

	THE UNITED STATES (WHITE)		JAPAN (HRYB)	
Industry Block	Large-Scale Industries	Small-Scale Industries	Large-Scale Industries	Small-Scale Industries
Ex	19.92 (11.03)	20.25 (2.62)	1.518 (.75)	2.585 (.98)
Ex^2	−.211 (−9.66)	−.237 (−7.62)	−.034 (.95)	−.087 (−1.92)
Ed	43.49 (17.24)	41.76 (10.33)	5.683 (3.62)	4.850 (2.28)
EdEx	−.538 (−5.89)	−.502 (−3.55)	.336 (3.26)	.251 (1.95)
CONST.	−290.9 (−8.24)	−290.2 (−5.53)	−57.88 (−2.31)	−51.19 (−1.49)
$\bar{R}^2$	.318	.263	.940	.881
N	2016	1152	66 Cells	54 Cells

Note: Notations are the same as in Tables XIII and I.

Table XV

Regression Results of Large-Scale VS. Small-Scale Industry Earnings Equations, Model 3, Males, Total Age Range, Manufacturing Industries, The United States (The S.E.O. Data) 1966, Japan 1967. Dependent Variable is Natural Logarithm of Hourly Earnings in U.S. Cents

	THE UNITES STATES (WHITE)		JAPAN (LNHRYB)	
Industry Block	Large-Scale Industries	Small-Scale Industries	Large-Scale Industries	Small-Scale Industries
Ex	.0099 (15.60)	.0096 (10.12)	.045 (17.67)	.025 (6.39)
Ed	.078 (30.00)	.082 (19.79)	.118 (20.35)	.106 (10.85)
CONST.	4.76 (122.4)	4.62 (81.38)	2.27 (23.99)	2.53 (16.32)
$\bar{R}^2$	.311	.255	.934	.830
N	2016	1152	66 Cells	54 Cells

Note: Notations are the same as in Tables XIII and I.

Table XVI

Regression Results of Large-Scale VS. Small-Scale Industry Earnings Equations, Model 5, Males, Older Age Range, Manufacturing Industries, The United States (The Parnes Data) 1966, Japan 1967. Dependent Variable is Hourly Earnings in U.S. Cents

	THE UNITED STATES (WHITE)		JAPAN (HRYB)	
Age Range	45 Through 59		40 Through 59	
Industry Block	Large-Scale Industries	Small-Scale Industries	Large-Scale Industries	Small-Scale Industries
Ex1	5.31 (3.81)	.702 (.41)	5.30 (10.67)	4.32 (8.78)
Ex2	2.77 (1.96)	−.461 (−.27)	−.26 (−.97)	−.34 (−1.81)
Ed	27.41 (11.54)	18.87 (6.44)	13.64 (19.84)	9.51 (15.23)
CONST.	−60.04 (−.93)	125.8 (1.59)	−110.5 (−7.92)	−58.93 (−5.46)
$\bar{R}^2$	.264	.189	.918	.911
N	537	284	132 Cells	108 Cells
$\bar{Y}$	358	304	105.0	73.2

Note: Notations are the same as in Tables XIII, V and I.

Table XVII

Regression Results of Large-Scale VS. Small-Scale Industry Earnings Equations, Model 5, Males, Older Age Range, Manufacturing Industries, The United States (The Parnes Data) 1966, Japan 1967. Dependent Variable is Natural Logarithm of Hourly Earnings in U.S. Cents

	THE UNITED STATES (WHITE)		JAPAN	
Age Range	45 Through 59		40 Through 59	
Industry Block	Large-Scale Industries	Small-Scale Industries	Large-Scale Industries	Small-Scale Industries
Ex1	.0095 (3.11)	.0018 (.32)	.049 (15.37)	.053 (8.79)
Ex2	.0027 (.86)	−.0034 (−.62)	−.005 (−2.62)	−.006 (−2.35)
Ed	.061 (11.75)	.056 (6.04)	.099 (22.55)	.096 (12.52)
CONST.	4.98 (35.20)	5.16 (20.85)	2.93 (32.86)	2.87 (21.67)
$\bar{R}^2$	.297	.188	.945	.894
N	537	284	132 Cells	108 Cells

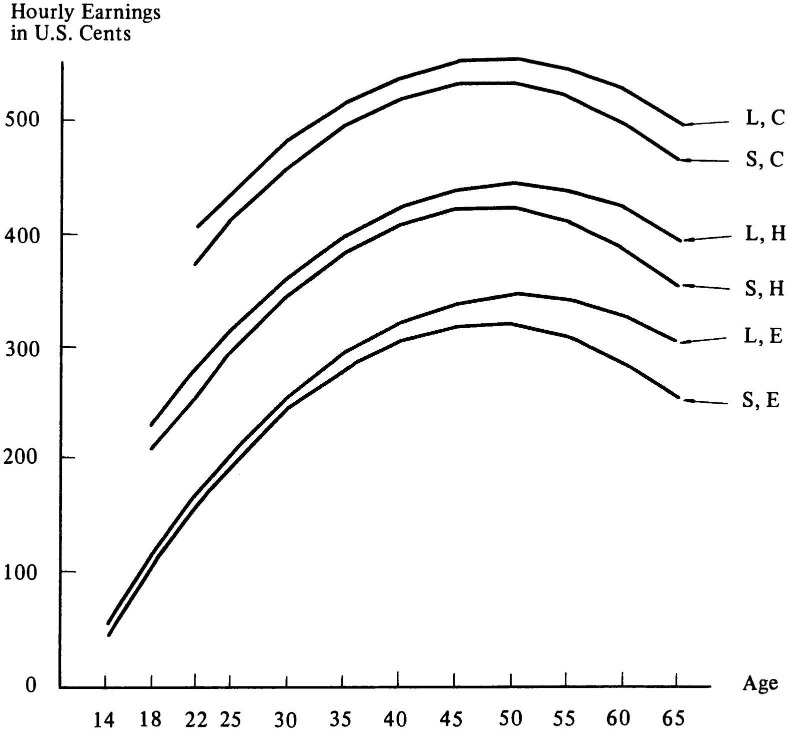
Note: Notations are the same as in Tables XIII, V and I.

Diagram XII

Large-Scale VS. Small-Scale Industries Earnings Profiles, The United States, Manufacturing Industries, White Males. Earnings are Predicted on The Basis of The Following Regression Results:

Large-Scale:
$$Y = \underset{(-8.24)}{-290.9} + \underset{(11.03)}{19.92\text{Ex}} - \underset{(-9.66)}{.211\text{Ex}^2} + \underset{(17.24)}{43.49\text{Ed}} - \underset{(-5.89)}{.538\text{EdEx}} \qquad \bar{R}^2 = .318$$

Small-Scale:
$$Y = \underset{(-5.53)}{-290.2} + \underset{(2.62)}{20.25\text{Ex}} - \underset{(-7.62)}{.237\text{Ex}^2} + \underset{(10.33)}{41.76\text{Ed}} - \underset{(-3.55)}{.502\text{EdEx}} \qquad \bar{R}^2 = .263$$



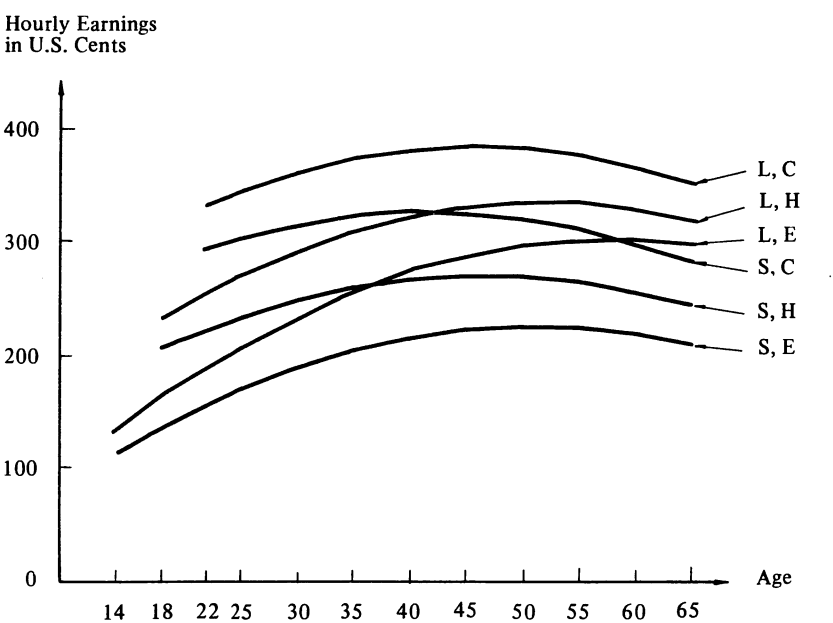
Notes: (1) L and S stand for Large-scale industry block and Small-scale industry block respectively.
(2) The other notations are the same as in Diagram III.
(3) The predicted earnings data are presented in Appendix Table B-5.

Diagram XIII

Large-Scale VS. Small-Scale Industries Earnings Profiles, The United States, Manufacturing Industries, Non-White Meles, Earnings are Predicted on The Basis of The Following Regression Results:

Large Scale: $Y = -66.20 + 11.17Ex - .087Ex^2 + 24.99Ed - .435EdEx$
$(-1.17)\ (4.21)\ (-2.83)\ (5.96)\ (-3.40)$
$\bar{R}^2 = .117$

Small Scale: $Y = -64.59 + 8.86Ex - .081Ex^2 + 22.43Ed - .352EdEx$
$(-1.59)\ (4.12)\ (-2.94)\ (1.88)\ (-3.09)$
$\bar{R}^2 = .171$



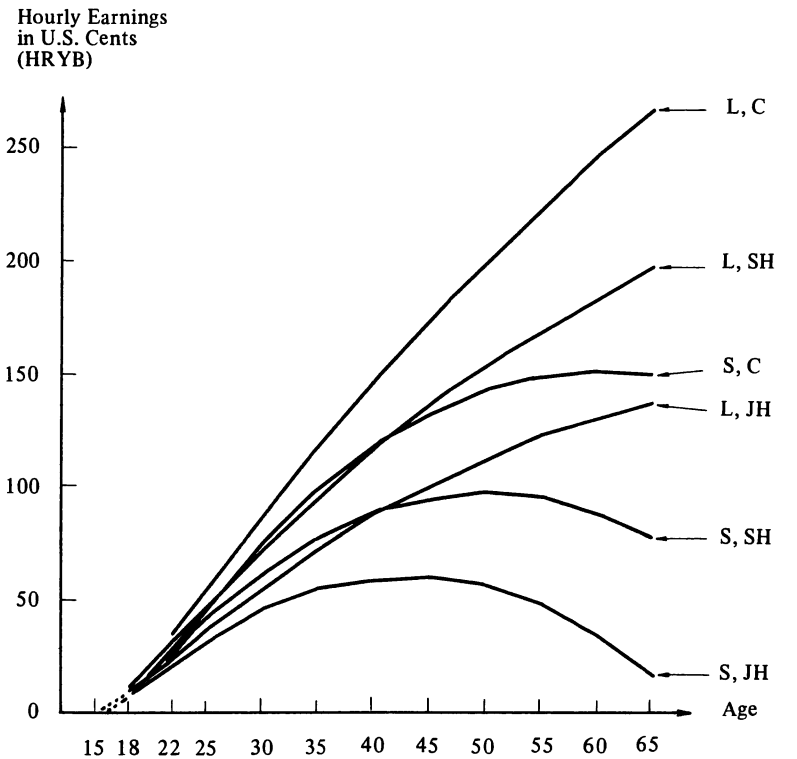
Notes: (1) The notations are the same as in Diagrams XII and III.
(2) The predicted earnings data are presented in Appendix Table B-5.

Diagram XIV

Large-Scale VS. Small-Scale Industries Earnings Profiles, Japan, Manufacturing Industries, Earnings (HRYB) are Predicted on The Basis of The Following Regression Results:

Large-Scale: $Y = -57.88 + 1.518Ex - .034Ex^2 + 5.68Ed + .336EdEx$ $\quad \bar{R}^2 = .940$
(−2.31) (.75) (.95) (3.62) (3.26)

Small-Scale: $Y = -51.19 + 2.585Ex - .087Ex^2 + 4.85Ed + .251EdEx$ $\quad \bar{R}^2 = .881$
(−1.49) (.98) (−1.92) (2.28) (1.95)



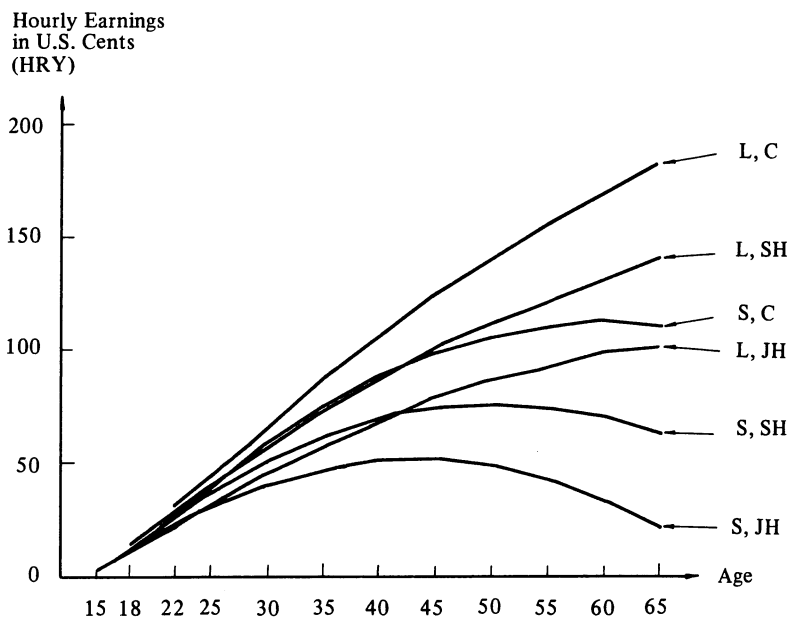
Notes: (1) Notations are the same as in Diagrams XII and IV.
(2) The predicted earnings data are presented in Appendix Table B-5.

Diagram XV

Large-Scale VS. Small-Scale Industries Earnings Profiles, Japan, Manufacturing Industries, Earnings (HRY) are Predicted on The Basis of The Following Regression Results:

Large Scale: $Y = -36.35 + 1.684Ex - .026Ex^2 + 4.234Ed + .185EdEx \qquad \bar{R}^2 = .936$
$(-2.03)\ (1.17)\ (-.99)\ (3.78)\ (2.52)$

Small Scale: $Y = -27.74 + 1.984Ex - .061Ex^2 + 3.355Ed + .164EdEx \qquad \bar{R}^2 = .874$
$(-1.16)\ (1.08)\ (-1.96)\ (2.27)\ (1.83)$



Notes: (1) Notations are the same as in Diagram XIV and IV.
(2) The predicted earnings data are presented in Appendix Table B-5.

4. Inter-Industry Analysis

As stressed in Chapter 3, the purpose of inter-industry analysis is to discern the possible biases contained in the estimated slope co-efficients of experience and education in the human capital models resulting from the ommission of relevant variables such as capital stock K, industry characteristics representing the distribution of the size of establishments S, product market concentration ratio C, and unionization ratio U.

Because of the limited availability of comparable data the scope of industry was confined to the manufacturing sector. For the United States, variables K, S, C and U were computed for each of industries classified by the Population Census Code (approximately comparable to 3-digit industry in the Census of Manufactures) and combined with individual sample observations of earnings data. For Japan, the identical variables were computed for each of industries classified by the Basic Survey of Wage Structure Industrial Classification (comparable to 2-digit industry in the Census of Manufactures) and combined with cell observations of earnings data.

The results of analysis are presented in Tables XVIII and XIX in the text and also in appended Tables A-32 through A-40. To facilitate cross-national comparison, only the results of partial logarithmic forms are reported.

Our findings may be summarized in two major points: the first relates to the change in slope-coefficients of expreience and education in response to the adddition of relevant variables, and the second concerns the impact of those variables on earnings.

First, let us look at the changes in coefficients of experience and education. When adding variables like K, S, C or U, the coefficients of experience and education exhibit only small and unstable changes, if any. This tendency is common in both countries. Upon closer look, however, it seems that the change in the estimated coefficient is somewhat more pronounced for education than for experience. But this difference is so small that we may not attach much weight to this finding.

The finding of insignificant change raises some questions concerning interpretation. May one meaning be that the power of supply factors in explaining the variation in earnings is so overwhelming that the demand factors play only marginal roles? Or does it mean that there was no compounding biases in the coefficients of experience and education?

The observed result does not necessarily affirm either question. As noted earlier, human capital variables represent not only supply factors but also demand factors. Therefore we should not interpret this result as indicating the dominance of supply factors in determining the distribution of earnings. The second question is not acceptable on the basis of this finding. For one thing, the high values of zero order-correlations between the added variables and experience, education and also earnings presented in appended Tables A-41

through A-43 suggest the possibilities of biases due to specification error. The fact that the possible compounding biases due to the ommission of relevant variables did not show up may have to be attributed to the way in which our data are organized. As cautioned in Chapter 3, the added variables can only capture between-industry variance, whereas experience and education can capture both between and within-industry variance. This finding may indicate the fact that the data has large within-industry variation and relatively small between-industry variation. For our test to be meaningful it is desirable that we have such data for the added variables that can capture within-industry variation as well.

Moreover, capital stock variable is the least significant of the variables in our models. It is too soon, however, to conclude the unimportance of capital stock in differentiating earnings on the basis of this finding. It is not unlikely that the poor measurement of capital stock concept is creating the attenuation effect.

The second finding is that the added variables all turned out to be effective in differentiating earnings though their effects appear much milder than the effects of experience and education. This latter point must be interpreted with caution, however. For the reasons discussed above the effects of industry characteristics variables may be considerably understated. While we can not make a meaningful cross-national comparison of the effect of capital stock because of the difference in the units, other variables may be compared since they are based on the common units of measurement. Comparatively speaking, it appears that the effects of both market concentration and the size of establishment are stronger in Japan than in the United States whereas the effect of union is stronger in the United States than in Japan. But this comparative evaluation is not warranted because of such problems as difference in the industrial classification scheme and deficient measurements of variables.

Table XVIII

Inter-Industry Analysis, Manufacturing Industries, The United States, White Males, Total Age Range, The S.E.O. Data 1966. Dependent Variable is Natural Logarithm of Hourly Earnings in U.S. Cents

	DEPENDENT VARIABLE IS LNHRY : N = 3170							
Ex	.0102 (18.95)	.0101 (18.65)	.0098 (18.39)	.0099 (18.57)	.0097 (18.22)	.0098 (18.25)	.0097 (18.20)	.0097 (18.39)
Ed	.083 (36.77)	.082 (36.44)	.079 (35.47)	.080 (35.86)	.079 (35.06)	.079 (35.07)	.078 (34.89)	.078 (35.29)
K		.0013 (3.56)	.0002 (.58)	.0011 (3.13)	.0009 (2.77)	.0010 (2.80)	.0003 (.87)	.0003 (.82)
U			.0041 (11.06)				.0030 (7.11)	.0034 (8.47)
C				.0031 (8.48)		.0007 (1.14)		.0019 (4.69)
S					.0024 (9.81)	.0020 (5.01)	.0014 (5.00)	
CONST.	4.67 (143.3)	4.66 (142.8)	4.43 (117.2)	4.57 (135.3)	4.62 (142.9)	4.61 (133.7)	4.47 (116.3)	4.42 (117.0)
$\bar{R}^2$	.301	.304	.330	.319	.324	.324	.335	.334

Notes: (1) K represents capital/labor ratio, U is unionization ratio, C is product concentration ratio, and S stands for size of establishment distribution of an industry (the ratio of employees employed in large establishments with more than 1000 employees to the total number of employees in an industry). All of these quantities are defined on the basis of Census Industrial Classification industries which are roughly comparable to 3-digit industries in the U.S. Census of Manufactures. Units for K are 1000 dollars and for U, C and S are percent.

(2) The rest of the notations are the same as in Table I.

Table XIX

Inter-Industry Analysis, Manufacturing Industries, Japan, Males, Total Age Range, 1967. Dependent Variable is Natural Logarithm of Hourly Earnings in U.S. Cents

	DEPENDENT VARIABLE IS LNHRYB : N = 120 Cells							
Ex	.036 (10.37)	.032 (10.85)	.034 (14.38)	.036 (15.68)	.035 (15.43)	.036 (16.66)	.035 (16.03)	.036 (15.82)
Ed	.114 (14.09)	.107 (15.37)	.108 (19.39)	.111 (20.72)	.110 (20.79)	.111 (22.09)	.110 (21.43)	.110 (20.96)
K		.037 (6.95)	.011 (2.08)	.014 (3.04)	.021 (4.68)	.014 (3.25)	.013 (2.72)	.010 (2.10)
U			.004 (8.02)				.002 (2.96)	.002 (2.20)
C				.007 (9.10)		.004 (3.79)		.005 (4.13)
S					.005 (9.22)	.003 (3.98)	.003 (4.79)	
CONST.	2.39 (18.18)	2.44 (21.94)	2.29 (25.22)	2.15 (23.76)	2.29 (26.64)	2.19 (25.53)	2.27 (27.14)	2.18 (24.23)
$\bar{R}^2$	.791	.856	.909	.918	.919	.928	.925	.921

Notes: (1) K, U, C and S represent the equivalent variables as in the case of the U.S. (Table XVIII) except that these quantities are defined in the Japanese case on the basis of industries which are approximately equivalent of 2-digit industries in the Japanese Census of Manufactures.
(2) The rest of the notations are the same as in Table I.

Notes to Chapter IV

1. There exist empirical findings of earlier sutdies which are somewhat comparable to the results of our regression analysis of experience-earnings profiles. Several research studies may be found for the case of each country. For the United States, we may list works by Hanoch (1965), Mincer (1971), Chiswick (1967), Hunt (1963), Malkiel and Malkiel (1973), Ashenfelter and Mooney (1968), Hansen, Weisbrod and Scanlon (1970) and Gwartney (1970). The Japanese earnings data have been analyzed by Blumenthal (1966 and 1968), Furuya and others (1969), Nakamura (1972), Sano and Nakamura (1970), Stoikov (1973 a, b), Kuratani (1973), and Napier (1973).

   Our results of interindustry analysis may be compared with the earlier works by Weiss (1966), Masters (1969), Haworth and Rasmussen (1971) and Ohtsu (1972).

CHAPTER V.
EVALUATION AND DISCUSSION

In this chapter we will summarize the findings of our empirical analysis and then evaluate their implications with reference to the different viewpoints and hypotheses advanced in chapters two and three.

Our discussion will be developed around three points of similarity and three points of dissimilarity between the United States and Japan. In addition the implications of the nenkō theories in connection with the discussion on the role of internal experience will be explored.

A. Similarities

1. Positive Effect of Experience and the Human Capital Hypothesis

One of the basic commonalities shared by both the American data and the Japanese data was the fact that experience has a positive impact on earnings.

The marginal effect of gross experience for American white males was 3.3 cents per hour and for Japanese males 1.8 cents for the hourly equivalent of earnings including special payments. The finding that the marginal impact of gross experience in raising earnings diminishes with age is also shared similarly by the United States and Japanese data. This diminishing trend, when measured by a squared experience term added to a linear experience term in a regression equation, turned out to be minus 0.2 cents for American white males and minus 0.1 cent for Japanese males. In other words, it was found that in both countries the shape of the experience earnings profile is one of an upward rising slope with a diminishing rate of increase.

The decomposition of gross experience into internal and external experiences does not seem to have altered the finding of a positive impact for experience. While within a limited age range the coefficient of external experience has turned out to be negative in some cases (e.g., for blue-collar workers and American non-white males) it is doubtful that this would occur

consistently over the entire age span. For one thing, the earnings profile for older workers appears to be strongly affected by the basic trend of physical depreciation. And further, our supplementary analysis of the entire age span of the Japanese data indicates that the effect of external experience is positive, although the magnitude is much smaller than that of internal experience. With these observations it seems to be safe to conclude that the experience exerts a positive impact in raising earnings in both countries.

In our conceptual framework in Chapter 2, several hypotheses were presented which explain the upward rising earnings profile. When contrasted with the finding stated above the explanation offered by the human capital approach appears difficult to reject, although this does not mean to exclude the possible adequacy of other competing hypotheses. Let us elaborate the considerations behind this evaluation below.

The human capital view essentially equates the rate of earnings with the efficiency or the amount of human capital held by a worker. The upward rising earnings profile thus implies the rising profile of the stock of human capital. The fundamental assumption of the human capital approach, as discussed in Chapter 2, is that human capital investment of some kind is made during the process of accumulating experience on the job. The process of experience, regarded as a process of investment, is assumed to incur investment costs by the very definition of the concept of investment. Mincer has assumed that the costs of on-the-job experience consist not only of foregone earnings during the time lost directly by training but also of additional foregone earnings which would have been obtained due to the increased efficiency created by the preceding training (Mincer 1962). It is questionable whether we can measure the cost of investment appropriately by this method. The desirable approach to prove the human capital thesis should be to predict the profile of earnings on the basis of independent observations of investment costs rather than deducing from the data of earnings. However, this is admittedly an exceedingly difficult task and to the knowledge of the author the evidence discovered thus far is only partial and is not sufficient for us to make a prediction of efficiency or earnings profiles.[1]

Without regard to the difficulty involving its operationalization, the basic concept of the human capital thesis itself is, in the author's judgment, quite valid. As discussed, the thesis depends crucially on two assumptions: the existence of investment costs during the process of experience on the one hand, and the operation of competitive market forces on the other. No matter how difficult it may be to measure the costs of experience, it is hard to deny the proposition that learning incurs costs of some kind. Likewise it is hard to deny the working of market forces entirely. An actually observed situation may be quite different from the situation which would be attained in the state of long-run equilibrium because of temporary disequilibrium or partial imperfections of market competition. But it is difficult to deny the

presence of market forces which work in the direction of restoring the equilibrium. And to the extent that these market forces are operative, wage profiles may not deviate excessively from efficiency profiles over the long-run, or universally. If these two assumptions are acceptable, then the rising earnings profile can be attributable at least in part to the increasing stock of human capital of a worker.

While the assumptions underlying the human capital hypothesis do not seem unreasonable, the assumptions which underlie alternative views appear to need more information to substantiate them. One of the competing explanations for the rising earnings profile postulates that workers prefer steeply rising earnings profiles to flat ones even at the expense of foregoing income during the early phase of their career. As discussed in Chapter 2 this hypothesis at the least depends crucially upon a key condition which is the workers' high expectancies of rewards for commitment. Although there are no reasons to deny, a priori, the possibility for this condition to hold, we have no justification for expecting this condition to hold *commonly* in both countries. What we need is more information which can substantiate this condition in the two countries. Still another view, mentioned briefly in Chapter 2, asserts that the way earnings are distributed is a matter of the operation of complex industrial relations rules which in turn depend on a host of economic, sociological, political, cultural and historical variables.[2] Indeed, this third view might offer the best explanation of all when it is elaborated in operational terms. Unfortunately, however, this view remains largely descriptive at this stage and lacks rigorous theorization.

The preceding evaluation should not be interpreted to mean, however, that the human capital thesis presents a complete explanation of observed earnings profiles. It has been stated only that the human capital view is not incompatible with our finding of a positive impact of experience when the two crucial assumptions were accepted.

2. Internal vs. External Experience and the Internal Labor Market

The second point of similarity was the fact that internal experience has a greater impact on earnings than external experience.

For American white males between the ages of 45 and 59, a one year increase in internal experience raises the hourly rate of earnings by 2.7 cents, compared with an increase of only .7 cents for external experience. The same trend is observed for non-white males, although the effect is not as large. In the case of Japanese males of age 40 to 59, the marginal effect of internal experience on hourly earnings without special payments is 1.4 cents, while the effect of external experience is negative (minus .2 cents).

Similar trends were found when the data were broken down by occupation. For American blue-collar workers of age 45 to 59 the marginal

rates of internal and external experience are 1.3 cents and minus .7 cents respectively, and for white-collar workers in the same age group the rates are 6.7 cents and 3.9 cents. For Japanese blue-collar workers the rates are 1.0 cent and minus .4 cents, respectively, while for white-collar workers the rates are 1.9 cents and .1 cent.

This tendency was also confirmed in the coefficients of partial logarithmic models. Further, the disaggregated analysis by the type of industry ascertained a similar pattern for both industry segments of the two countries. As mentioned earlier, the observed negative coefficients of external experience are probably due largely to the limited age range of our data. For example, there may be a tendency toward workers' physical depreciation in these older ages. An analysis of the Japanese data over the total age range revealed that the coefficients of both types of experience are positive, although the internal experience coefficients are much larger. These consistent findings lead us to the conclusion that internal experience has a greater impact in raising earnings than does external experience, both in the United States and in Japan.

Both the human capital and the internal labor market hypotheses have offered the same expectations for this finding. Let us evaluate the relevance of these hypotheses for our finding.

The human capital hypothesis postulates that since the content of internal experience is more closely related to the task of the current job than that of external experience the marginal effect of internal experience is greater in improving the worker's efficiency in performing the current job than that of external experience. Using the concept of specific training developed by Becker, the internal experience at least partly represents specific human capital which is not produced by the external experience. Insofar as the specific human capital raises a worker's marginal productivity only within the firm in which the specific training has been provided, the difference between the effect of internal experience and of external experience on earnings grows larger as the degree of specificity becomes greater. Thus the key factor which differentiates the impact of internal and external experience on earnings is obviously the degree of specificity contained in the internal experience.

Human capital theorists tend to infer the degree of specificity from the wage differential.[3] By equating the specificity with the expected wage differential it runs the risk of either ignoring other important factors which are simultaneously giving rise to the expected wage differential or of compounding the effects of other variables with the effect of specificity. The desirable methodology should be to predict expected productivity differentials on the basis of independent observations of the degree of specificity contained in training.

The internal labor market hypothesis has introduced a concept of internal

promotion which signifies the importance of the internal experience (Doeringer and Piore 1971). Based on extensive field research of employment practices of a number of firms, proponents of the internal labor market hypothesis contend that as the scale of production expands and the system of production increases its complexity by organizing increasingly specialized labor, a highly structured internal labor market emerges within the firm. This market is then governed by a set of administrative rules, customs, agreements with unions, and organizational and technological constraints.

Indeed, the internal labor market is in many ways independent from the direct influence of the external labor market. For one thing, the highly structured internal labor market has very few ports of entry relative to the number of jobs existing within the internal market (Doeringer 1968). Most of these internal jobs are not open directly to the outside labor market but are filled primarily by internal transfer and promotion of workers. These jobs are therefore not directly subject to competitive forces of the external market. External market forces do exert an influence on determination of the internal wage structure but their influences are transmitted only through a set of internal rules (Hildebrand 1957, Livernash 1957).

If most jobs are filled by the internal promotion of employees, if ports of entry are open only for jobs at the lowest rung of the promotion ladder, and if the rate of earnings increases with promotion, then earnings should increase only with the internal experience and not with the external experience. There are of course situations under which external experience can relate positively with earnings. For example, internal labor markets, may have ports of entry at the middle rungs; also certain external experiences, especially those not obtainable within the firm, may serve as a qualification for entry to higher level jobs.

If we accept these two crucial assumptions, namely the dominance of internal promotion and the correlation of wage rate and promotion, the hypothesis of the internal labor market seems to offer a reasonable explanation for our findings. Also, the concept of internal promotion offered by this hypothesis may be interpreted to explain at least in part the content of specificity proposed by the human capital thesis.

In sum, both the human capital hypothesis and the internal labor market hypothesis offer predictions not incompatible with our findings. But due to the weakness in the empirical verification, the significance of specific human capital remains yet to be seen. On the other hand, the validity of the latter hypothesis depends on the empirical validity of the assumptions of internal promotion and promotion-earnings correlation. Integrated empirical research on these aspects of the two hypothesis would promote our understanding of these issues.

3. A Comparative Evaluation of the Nenkō Paradigm: A Digression

Since the concepts relating to internal experience seem to share many elements with the Japanese born paradigm of the nenkō system, it may be useful to compare the relevant elements of nenkō theories with the points of foregoing discussion.

Nenkō chingin-seido, the system of wage determination based primarily and strongly on the length of service of a worker under a particular employer, is understood as "one side of the coin" of a whole employment system. The other side of the coin is the practice known by the name of shūshin koyō seido, or the life-time commitment system. According to the nenkō system thesis, the entire system works through the operation of these two key subsystems, sometimes in combination with the conditions of labor market dualism, the dualistic structure of internal labor markets and Japanese enterprise unionism.

With this introduction, let us focus our attention specifically on the relevant nenkō concepts pertaining to the two points discussed above, namely the content of specific human capital and the dominance of internal promotion tied to wage increases.

Since specific human capital is useful only within the firm in which the investment, the investment cost may be born by the employer. Let us first examine how the nenkō theorists view the usefulness of the concept of specific human capital.

While it has not been the majority opinion some analysts contend that the nenkō system of promotion is a system of allocating labor according to skill and efficiency and as such the nenkō wage profile reflects a worker's efficiency profile (Koike 1966, Taira 1970). Tsuda (1961) suggests that the origin of the nenkō wage system is traceable to the period during which modern skills were untransferable from firm to firm because industrialists rapidly imported heterogeneous foreign know-hows in the early phase of Japanese industrialization. While this hypothesis of technological untransferability of skills certainly seems to make sense in the early phase of development (Shimada 1969), it is questionable whether it applies to the subsequent stages of higher development. However, in characterizing the nenkō wage system in modern Japan, the primary factor is not so much the technical untransferability of skills as it is the institutionalization of the earlier practice (Code 1972). At any rate, the nenkō paradigm is at least compatible with the human capital view that internal experience is more productive inside than outside the firm.

But upon closer look, the concept of efficiency in the nenkō paradigm appears to include more elements than is usually meant by the concept of measurable efficiency. The concept of "kogai," or a loyal worker who has been brought up within the firm ever since his childhood, is useful in

illuminating this point. It is likely that the measurable efficiency of a kogai worker may not be different from a non-kogai worker of equivalent qualifications in a modern industrialized economy in which production techniques and skills are well standardized. Yet, it is often observed in the Japanese firms that a kogai worker is paid higher wages than his non-kogai counterpart simply because the former has more internal experience. If this wage differential is to be attributed to the efficiency differential, then efficiency in this case might have to include such elements as the greater ease of maneuverability, greater predictability and stability of behavior, lower propensity to become a union activist (all as perceived by the employer), or simply the employer's greater satisfaction of maintaining such workers. Thus, in order to reconcile the paradigm of the nenkō system and the efficiency framework, the concept of efficiency has to be extended beyond the usual sense of measurable efficiency.

Secondly, let us consider the cost of training. The nenkō view appears to differ rather sharply from the human capital thesis on this point. As exemplified by the oft-quoted phrase of "tanshinsha chingin" or the low wage which can barely support a bachelor, the model of the nenkō system postulates that workers are paid less than their productivity while they are young and in return expect high rewards when they are old (Fujita 1961). The human capital view rejects this view as being unlikely when market forces are at work, as seen in chapter 2. We have suggested that this view is not incompatible with assumptions of a competitive labor market if certain conditions are met.

What seems to be implied by the nenkō model is the system of highly selective employment and internal promotion which exist in a basically labor surplus economy. Since the external labor market is characterized by almost unlimited quantity of labor supply, the employer is able to recruit workers at a very low wage rate. But at the same time the employer wants to select workers with the greatest potential and trainability since desired skills have to be developed largely within the firm.

Confronted with a high degree of uncertainty associated with the potential quality and commitment of his workers, the employer promises high rewards in the future in return for commitment. But the nenkō model emphasizes that this is not guaranteed automatically to every worker. It may be obtained by only a selected group of workers who have won it through the constant and severe process of internal selection and competition.

The model asserts that the nenkō system can maintain itself even in a stagnant economy by taking advantage of this rigorous internal selection process which encourages competition among workers and weeds out less productive workers. Workers are willing to remain in this system not so much because they like it but because of extremely limited alternative opportunities available elsewhere. In relative terms, the nenkō firms are the ones which

provide better employment opportunities.

In a rapidly growing economy, on the other hand, the nenkō system can also maintain itself well without the process of weeding out. It may be possible to accept the view that the rapid postwar growth has relieved employers from the strong opposition of unions to this weeding out process. But the selectivity in recruitment and promotion itself is maintained primarily in order to attract and retain workers who are perceived by the employer to have greater potential and trainability.

Viewed in this way it is seen that the different cost considerations of the nenkō thesis, as compared with the specific human capital hypothesis, are rooted deeply in a different environmental perspective.

Let us now turn to the question of the dominance of internal promotion. At first glance, the nenkō paradigm and the internal labor market hypothesis seem to share this point synonimously. But upon closer scrutiny, we notice that there are some differences in the way it is emphasized. While the internal labor market hypothesis stresses the inevitability of internal promotion primarily in terms of such general factors as organizational complexity, technical constraints, administrative rules, agreements with unions, and customs, etc., the nenkō paradigm emphasizes such specific features as a labor management philosophy which places primary importance on quasi-family relationship within the firm (Hazama 1964), the practice of recruitment geared to new school leavers (Funahashi 1966), and the tradition of the kogai system (Fujita 1961).

In the judgment of the author, while the United States and Japanese might share such factors as organizational complexity and technological constraints, there are differences between the two countries in terms of other factors, such as the nature of the union involvement in the determination of promotional rules and the institutionalized administrative rules and customs. For example, the union's deep involvement in regulating promotion and demotion on the basis of seniority rules (Slichter, Healy and Livernash 1961) finds almost no counterpart in Japan. On the other hand, the excessive emphasis placed on new school leavers in the Japanese employment system, which has greatly limited the ports of entry to a firm, appears to be in part the consequence of the institutionalized emphasis of the "kogai" system.

Finally, let us consider the assumption of high correlation between promotion and earnings. It should be noted that this assumption was not explicitly stated by the proponents of the internal labor market hypothesis. This was considered by the author to be necessary for the internal labor market hypothesis to posit a greater marginal effect for internal than external experience in raising earnings. While it is less clear in the United States how much progress in earnings does internal experience mean, in Japan in contrast the correlation between internal experience and earnings seems to be more strongly warranted. This is due to the fact that the system

of determining the rate of earnings is essentially based on the length of service, supplemented by the cost of living allowances.[4]

To sum up this comparative evaluation, the American and Japanese theories which refer to the similar facts, while seemingly sharing many theoretical points, were found to have quite dissimilar broader perspectives which are tied to specific environmental conditions in the two countries.

4. Differential Between Blue-Collar and White-Collar Earnings Profile

The third point of similarity between the United States and Japan was found in the pattern of differentials between the blue-collar and white-collar earnings profiles.

Since this finding was discussed in some detail in Chapter 4, let us summarize only the essential point. When measured by linear approximation of Model 1, the relative differential in the marginal effect of experience, as well as education, on earnings between blue-collar and white-collar earnings profiles turned out to be remarkably similar between the United States and Japan.

In both countries alike, the marginal effect of experience of white-collar workers was approximately twice as large as that of blue-collar workers, and the marginal effect of education on the earnings of white-collar workers was approximately 2.5 times greater than that for the blue-collar workers. A similar relationship was also found where the quadratic and partial logarithmic forms were used in the analysis. Thus, the pattern of blue and white collar occupational differntials is very similar between the two countries, not only in terms of a rough linear approximation but also in terms of somewhat closer non-linear approximations.

To interpret this point, I would like to refer to two viewpoints: the human capital point of view and the theory of labor market stratification.

The interpretation which would be advanced by the human capital view is straightforward. Insofar as the rate of earnings reflect the level of efficiency and thus the stock of human capital, the different earnings profiles of blue and white-collar workers should reflect the different amount of human capital investments. The pattern of this inter-occupational difference in human capital investments would be presumably similar between the United States and Japan.

In both countries, those who are engaged in white-collar occupations must have invested greater amount of resources in education, and perhaps also experience on the job, than those who serve in blue-collar jobs. The underlying suppositions are that white-collar workers spend a greater amount of resources in formal schooling than blue-collar workers and that white-collar workers invest more than their blue-collar counterparts in learning

more highly rewarding skills on the job. While the former point sound reasonable, the latter seems to need more empirical information to be warranted.

On the other hand, the labor market segmentation view emphasizes the discouraged competitive relationship between the segments of blue and white-collar occupations. As mentioned earlier, the distinction between blue and white-collar occupations was found to be one of the most evident examples of social stratification (Blau-Duncan 1967).

This view emphasizes that because of unequal distribution of financial resources and occupational information, etc., competition does not take place or if it does it is discouraged. For example, some individuals who are brought up in manual worker families may not know about opportunities in white-collar jobs. Or even if they are informed, they may be discouraged from choosing those jobs because of perceived uncertainty and unfamiliarity, and perhaps also by the lack of financial and other resources to build sufficient qualifications for entry. The results of numerous studies which relate one's occupational choice with his educational attainment and family background, such as parental education, occupation and financial status, suggest that this view of market stratification is not unreasonable (Blau and Duncan 1967, Duncan, Featherman and Duncan 1973). When translated in terms of marginal productivity theory, the market stratification hypothesis points out that the supply of labor to the more advantageous occupation is being reduced because of these obstacles. Consequently, the rate of earnings for those occupations is held higher for those reasons, in addition to the possible genuine difference in the stock of human capital.

Both views are not incompatible with our findings and suggest interesting points of inquiry. But with the limited information currently available to us, neither of them could show why the pattern of inter-occupational differentials is so similar between the two countries. To advance our understanding on this point, more empirical information needs to be obtained from both countries.

B. Dissimilarities

Our empirical analysis has found three conspicuous points of dissimilarity between the United States and Japan. The first two relate to the shape of aggregate earnings profiles, while the third is concerned with inter-industry (size of an establishment) differentials. In discussing these points of dissimilarity, I will comment on the first two points together and discuss the third separately.

1. Lower Effect of Experience in the United States and Higher Effect in Japan

The effect of experience in raising earnings appears to be much higher in Japan than in the United States. Measured by a partial logarithmic regression equation the marginal effect of experience on earnings in the United States was only .9 percent for white males and 1.3 percent for non-shite males, whereas for Japanese males it was 2.5 percent; even excluding the component of special payments, the effect was still 2.2 percent. In other words the impact of experience in improving the status of earnings in Japan is at least twice as great as it is in the United States.

2. Negative Education-Experience Interaction in the United States and Positive Interaction in Japan

The second point of dissimilarity was found in the behavior of the education-experience interaction between the two countries. When analyzed by Model 2, the interaction term of education and experience yielded a clear cut negative coefficient in the case of the United States. The result for Japan was not reliable because of low precision of estimates. This ambiguity was removed however by the use of Model 4. It was found that the interaction effect grew systematically stronger with the level of education in Japan. These results and other supplementary results led us to conclude that in the United States workers with higher education do not enjoy additional marginal increments in earnings through experience, perhaps because of high starting earnings compared with their less educated counterparts who start at lower levels of earnings. In contrast, Japanese workers with high educational attainment, while starting at a relatively low level of earnings, enjoy sharp increase in earnings as experience increases. This trend grows stronger as the level of education increases.

In making an evaluation I would like to introduce three relevant points of view: the human capital view, the expectancy view, and the institutional descriptive view.

The human capital view would offer an explanation based on the difference in the productive nature of on-the-job experience between the United States and Japan. In the United States, elements of learning and training contained in the process of employment experience are not instrumental in increasing the productivity of a worker and do not stretch over a long period of time in the worker's career. In Japan, in contrast, learning and training opportunities are an important component of the process of employment experience, and their effects on earnings last throughout the occupational career. Consequently, while the efficiency of a worker increases mildly and reaches its peak relatively early in the case of the United States, the trend of

efficiency increase is sharper and continues longer in Japan. The observed difference in the earnings profiles reflects this different pattern of human capital investment.

This view does not sound unreasonable and presents interesting implications. But for this view to be convincing it has to be reinforced by the evidence that the productive nature of experience really differs between the two countries, in the sense that it is less effective and less permanent in the United States than in Japan. As noted earlier in connection with the discussion of similarity, research findings on this point are still insufficient to draw any reliable inferences.[5] At this stage there still remain doubt as to whether we can attribute the difference in earnings profiles primarily to the difference in the pattern of human capital investments.

The expectancy view offers a rationalization for deferred payment arrangements. As was implied by the model of the nenkō system, the slope of earnings profile can be quite steep when payments are made under the deferred system since the worker foregoes part of his obtainable income while he is young and recoups it when he is old. In Chapter 2, it was suggested that the system of deferred payments is feasible in a competitive labor market when certain conditions are met. The crucial condition for it to take place is a worker's expectancy concerning the future rewards to his commitment.

Viewed from this standpoint, our finding may have an interesting implication. The American worker may have a lower expectancy, or perceives a lower subjective probability relative to the Japanese counterpart, concerning the likelihood that a commitment to his employer will induce a large reward in the future. Therefore the American worker is more interested in receiving a reward which is commensurate with his current productive service instead of waiting for a potentially large but uncertain future outcome. Even if the present valence associated with the high future income is assumed to be the same for American and Japanese workers, the difference in expectancy can result in different attitudes and actions in occupational choice and work performance. It is therefore suggested that the American worker, faced with a choice between the deferred payment and the immediate payment, is less willing to take the deferred payment than is his Japanese counterpart.

If this difference in expectancy is indeed the case, the logical question to be pursued would be what are the factors which give rise to this attitudinal difference. If we accept the view that a man's cognition depends importantly on repetitive learning, then it might be postulated that an individual's pattern of expectancy is crucially affected by his past observations of his reference groups, such as older cohorts of similar social economic status. We might speculate that American workers have lower expectancy since they have rarely observed the situaiton in which commitment was rewarded highly during older ages, whereas Japanese workers have formed a higher expectancy because they had been informed and educated by family members

and friends that commitment would yield high returns in the future; or perhaps they had witnessed such a case themselves. It should be noted, however, that this does not necessarily mean that the pattern of expectancy is unchangeable. Indeed, it should change as long as envionmental factors which are responsible for the formation of expectancy do change overtime or vary cross-sectionally.

In addition to the nature of expectancy, the aspect of valence deserves some attention. In Chapter 2, we have discussed the preference of workers for steeper earnings streams as one of the conditions for the deferred payment system. There may be many factors leading to this preference. If the expected life time profile of cost of living is such that the costs increase sharply toward old ages then the worker might see higher valence in a steeply rising earnings profile than a flatter one. But the expected cost of living profile may vary depending on the family system, the system of financing education, the system of household finance, social security systems, etc.

The model of the nenkō system discussed earlier indicated that in a labor surplus economy workers are willing to take jobs in the nenkō firms which offer less than marginal productivity wages at the beginning of employment. The value of these nenkō occupations may be higher than alternative occupations not because workers prefer steeper earnings profiles or because they have high expectancies of high future rewards, but because alternative occupations are considered to be non-existent or to have inferior rewards. In other words, the valence recognized in a society of scarce opportunities may be associated with the value of the job opportunity itself rather than the value of earnings as such.

The third view emphasizes the difference in the institutional backgrounds of the two countries. It emphasizes for the United States such factors as the practice of contract making, high labor mobility, and the impact of American type trade unionism. It is not surprising that in such an ethnically and culturally heterogeneous society as the United States the practice of making an explicit contract is recognized as a fundamental necessity and prerequisite for any transactions. This view may prevail in society to the extent that it is accepted as a basic social custom (Evans 1971). A labor contract is not an exception. Further, ever since the colonial era high mobility of labor was believed to be, perhaps not unreasonably, one of the peculiar features of the American labor market (Ross 1958). Moreover, it has been recognized that one of the significant impacts of American unionism has been its control of job opportunities, or at least its role in standardizing the rules of wage determination and job allocation (Perlman 1928).

These institutional conditions imply that the determination of the rate of earnings is made on the basis of well defined jobs, a prerequisite for contract making. Due to the constant pressure of potential turnover, the rate may not deviate unreasonably from the value of a worker's productive contribution.

Where the impact of the union is pressing, this entire process is articulated and standardized.

With the progress of industrialization and the consequent development of large productive organizations, the connection between intra-organizational jobs and external market forces grew increasingly loose and the value of the marginal contribution of a worker became increasingly nebulous. But the traditional values and practices were institutionalized in a complex web of rules under this new situation to form the American principles of equity.[6] The institutional view emphasizes the role of this equity principle in determining the distribution of earnings.

The Japanese principles of equity have been developed out of quite dissimilar environmental conditions. The vagueness of the concept of the "job" in the Japanese labor market, especially in the structured internal labor market, is widely recognized by institutionalists (Ujihara 1948, Tsuda 1961). It is inferred that this vagueness has given rise to a broad range of discretion within which the wage rate was to be determined. Unlike the case of the United States, there was little pressure from the union or from potentially high mobility of labor. Even if this pressure existed it would have been difficult to standardize rules of wage determination since the well defined basis of the job itself was absent.

However, there had to be some principles or rules of wage determination to fill this gap. Ōkouchi (1959) contends that the predominantly rural quasi-family relationship was transplanted in modern factories to assume this role. Fujita (1961) argues that the hierarchical order of pre-industrial bureaucratic organizations was introduced. Kawada (1965) suggests that the informal master-client relationship of mine gangs was internalized in the rules of modern workshops. Hazama (1964) stresses the influence of the traditional commercial family system. I am not prepared to rank or determine the validity of these hypotheses. The point is that the institutional view contends that the distribution of earnings is determined largely in accordance with the Japanese equity principles which were established on the basis of some kind of social order, whatever its sources may be, by taking advantage of the absence of a precise concept of jobs and a vigorous involvement of unions in this matter.

Institutional views, by their very nature, tend to stress dissimilarities. While they are useful in enriching our insights into dissimilarities, it is hard to prove or disprove them at this stage partly because they employ a great many variables which are difficult to incorporate rigorously into a consistent model, and in part they are ad-hoc descriptions.

3. Different Patterns of Differentials between Large-Scale and Small-Scale Industry Earnings Profiles.

The pattern of differentials which exist between the earnings profile of the large-scale industry block and that of the small-scale industry block was found to differ sharply between the United States and Japan. The pattern of differentials observed in the United States was that the earnings profile of large-scale industries stays markedly higher than that of small-scale industries throughout the whole span of worker experience. In other words, the two experience-earnings profiles are parallel, with a considerable initial differential in the rates of starting earnings. On the other hand, the Japanese pattern of differentials is one of expansion with the length of experience. There is hardly any differential between the two industry blocks in the level of initial earnings. But while the rate of earnings increases only moderately in small-scale industries, it increases sharply in large-scale industries. And as a result, a large differential is created between the two blocks as the length of experience increases.

I would like to discuss this finding by integrating the efficiency hypothesis and the market segmentation hypothesis. The efficiency view would explain the finding as follows. In the United States the efficiency of workers employed in large scale industries is admittedly higher than that of workers in small scale industries from the beginning and consistently throughout the span of their career. In Japan, on the contrary, the efficiency of new entrants is not appreciably different between large and small-scale industries, but the efficiency of workers of large-scale industries increases sharply as they accumulate experience, and accordingly the inter-scale differential expands markedly.

In terms of the behavior of human capital investment for both the employer and the worker, and the worker's occupational choice behavior, this view presents interesting implications for the difference between the two countries. In the United States, employers in large-scale industries try harder than employers of small-scale industries to recruit workers who are apparently more efficient or of higher quality. Since the efficiency appears to be higher from the beginning of their career, workers in large-scale industries seem to have had more education and/or vocational training prior to entrance than did their small-scale industry counterparts. While a great stress seems to be placed in this selective recruitment it is not obvious how much stress is put on on-the-job training in American large-scale industries. At least from what we can see in the shape of earnings profiles, the evidence is not clear that American large scale industries emphasize on-the-job training substantially more than small-scale industries. A speculation might be possible that American workers with higher qualifications are not so much interested in on-the-job training or learning as in getting high incomes at the early stage of their career.

On the other hand in Japan, two alternative interpretations are possible. One is that large-scale industries, while recruiting workers whose initial efficiency is not different from their counterparts in small-scale industries, select among applicants those who have greater trainability and potential for future developments and simultaneously provide jobs which contain greater opportunities for learning than is the case in small-scale industries. The other interpretation is that large-scale industries recruit workers who are superior both in terms of initial efficiency and trainability than those who would end up being employed in small-scale industries. But workers in large-scale industries have stronger preference than their counterparts in small-scale industries for choosing such occupations that contain greater opportunities for learning. Since learning takes time, in addition to other resources, those workers have to forgo part of their initial productivity during the learning period. Consequently, their actual efficiency appears to be much lower than their potential efficiency at that time. If it is not unreasonable to assume that the initial efficiency of a worker and his potential efficiency are related, then the latter interpretation would seem more reasonable in Japan. In both interpretations it is agreed that on-the-job training is stressed much more in large-scale industries than in small-scale industries and that workers in large-scale industries are more willing to invest in themselves through experience.

These are the implications derived from the assumption that the different structures of earnings have been generated entirely by the different patterns of human capital investments. Interesting as it may be, this view is unfortunately neither proved nor disproved with our limited information.

The market segmentation hypothesis on the other hand, offers an alternative view concerning the factors which generate the observed earnings differentials. In my judgment the market segmentation hypothesis would modify the interpretations provided by the human capital hypothesis.

Essentially, the market segmentation view, in the author's interpretation, stresses the fact that the unequal distribution of resources such as information, financial, occupational and social resources of family, etc., will create obstacles which bar the free operation of market competitive forces and in effect segments the market. Let us elaborate on some relevant points of this hypothesis pertaining to our findings.

First, consider the effect of unequal distribution of information. It was suggested in Chapter 2 that the limited diffusion of information and costliness of search can give rise to earnings differentials. Low wage employers sometimes can co-exist with high wage employers in an economy if they could take advantage of paucity of information accessible to workers in the local labor market (Fuchs 1967).

In view of the spatial distribution of industries and spatial structure of American labor market, the human capital hypothesis might indeed have

overestimated the "efficiency differential." At least part of the observed inter-scale differential may legitimately be attributed to spatial segmentation of American labor market due to insufficient and unequal distribution of market information.

On the other hand, it seems that the extent to which the inter-scale differential is attributable to spatial segmentation can not be greater and may be smaller in Japan than the United States. For one thing the spatial breadth of the Japanese labor market is much smaller; and perhaps more importantly, major industrial areas have a fairly homogeneous structure in terms of distribution of large and small-scale industries.[7] Indeed, the observed narrow inter-scale differential at the early phase of age-earnings profiles seems to suggest that there is little segmentation in the market of young job seekers (Sumiya 1961).

Secondly, related to this type of segmentation is the role of unequal distribution of financial and other environmental resources such as family backgrounds, community resources etc. in aggravating the segmentation. Even if market information is available some people may not be able to apply for the more advantageous jobs because of the lack of financial resources to cover moving costs. Or more basically, the lack of financial and family resources may prevent the less advantaged people from obtaining appropriate occupational information. Moreover the lack of familiarity and suitable "culture" may increase the perceived uncertainty and psychological costs for some people and discourage them from applying for certain jobs or reduce their motivation and commitment (Priore 1972). All these conditions, phrased in terms of micro-economic terminology, weed out the potential supply of the less endowed people or discourage them from joining the supply directed to the more advantaged job opportunities. This type of segmentation, a result of the unequal distribution of endowed resources, appears to be responsible at least in part for the widely recognized inter-regional and inter-racial labor market dualism of American economy. In the Japanese case the degree of segmentation arising from the barriers of costs of movement and occupational "culture" seems less crucial. What seems to be more important in Japan is the cost of transferring between employers which is amplified particularly under the deferred wage system.

Third, the element of racial discrimination should be mentioned. Although ethnic discrimination is not totally absent in Japan, its magnitude and importance in characterizing the national structure of earnings seems far less important than in the American labor market. In the United States, it is widely observed that non-white workers are paid much less than white workers even after controlling for major labor force characteristics.[8] It is suggested that an important part of inter-scale differentials in the American labor market is associated with the element of racial discrimination, or at least the uneven racial distribution of employment among different industry

segments.[9]

Fourth, the role of the union deserves attention. When the union intervenes in the process of employment by restricting the recruitment through hiring halls or other means, or by discriminating against certain workers, it in effect contributes to segmentation of the market. Comparatively, American unions, because of their structure and functions, appear more likely to add to the degree of segmentation than do their Japanese counterparts.[10] Since unions are organized more intensively in large-scale industries in both countries it may be reasonable to think that part of the inter-scale differentials is attributable to the impact of the union.[11]

Finally, a view may be mentioned which stresses the "prestige" factor as a possible force which regulates the shape of earnings profiles. Points one through four discussed above are relevant in rationalizing differentials in terms of levels of earnings but have little to do with the shape of earnings profiles. The "prestige" view suggests that steeply rising earnings at higher age levels as was witnessed in some of the Japanese earnings profiles, might represent not so much the worker's efficiency as much as the employer's prestige consideration. This high wage in old age is not entirely without economic benefit from the viewpoint of an employer. Indeed this might stimulate motivation and commitment of workers by assuring them a sense of security. Further it may be beneficial in that it would give a good public image to the employer and make it easier for him to attract and select a more desirable type of workers.

There are reasons to believe that this consideration of prestige or public image plays an important role in the Japanese wage determination (Sano, Koike and Ishida 1969, Shimada 1970). It might be possible to reinterpret elements like public image as a form of efficiency.

The nenkō model suggested that the nenkō firms provide steep earnings profiles in a basically labor surplus economy. The prestige view would characterize this as a prestigeous wage premium since the nenkō firm did not have to pay it in order to recruit and retain the workers. On the other hand, the efficiency view would offer for the same phenomenon an alternative explanation that the premium aimed at increasing the efficiency of the firm through a sort of external economy, such as the increased motivation of the rest of employees and the reduced cost of search for the desired type of workers. Since neither model may be rejected conceptually, the validity of the model will have to be determined on the basis of how useful their behavioral implications are for the issue of wage determination.

Notes to Chapter V

1. While there have been a large number of evaluation studies which have attempted to measure costs and benefits of institutional manpower training programs, very little is known about the costs of informal on-the-job training or of learning during work experience. Some of the many evaluations of manpower programs are Somers and Stromsdorfer (1964), Cain and Stromsdorfer (1968) and Hardin and Borus (1971). Borus (1972) provides a recent review of these evaluations.

   In spite of the apparent prevalence and importance of on-the-job training, as suggested by Myers (1971), there has been very little empirical research which attemps to measure the costs of on-the-job training directly. Some preliminary but rare efforts in this direction may be found in Somers and his associates (1971) and Somers and Roomkin (1972).

   A number of researchers have tried to isolate the effect of occupational experience or education from confounding effects of other variables such as race, innate ability, specialization in skills and knowledge, commitment to work, and family background etc. For example, see Hunt (1963), Ashenfelter and Mooney (1968), Hansen, Weisbrod and Scanlon (1970), Griliches and Mason (1972), Malkiel and Malkiel (1973), Bowles (1972 and 1973), Annable and Fruitman (1973) and Roomkin and Somers (1974). Although these studies have provided us with insights into the net impact and the role of work experience in determining earnings, we still need more direct observations and information on the costs of work experience and learning on the job.
2. Theories of the internal labor market, the nenkō system, and other institutional models of labor markets may be seen as examples of this view. For proponents of these theories, refer to the brief list presented in Footnote 3 of Chapter One. Dunlop's well known work (1958) on industrial relations systems can be interpreted as encompassing these approaches.
3. For example see the definitions of specific human capital given by Parsons (1970) and Kuratani (1973).
4. Kaneko (1972) emphasizes the particular characteristic of the Japanese system of wage distribution which relies heavily on the length of service and age. This characteristic has been instrumental in preventing the introduction of *shokumukyū* system (the job based wage system) which was advocated strongly by employers. Even if the shokumukyū system was introduced Funahashi (1961) pointed out on the basis of case studies that the system exists only in name and the wage rates are determined practically by the nenkō principle.

   As suggested by Magota (1972), Kaneko (1972) and Odaka (1967), it is widely accepted that the principle of cost-of-living compensation has played an integral role in determining the pay structure during the period shortly after the end of World War II. Origins of this principle may be traced, however, to a much earlier date as indicated by an intensive historical survey conducted by Kaneko and his associates (1960).

   It appears that these principles, which stress a worker's length of service within a certain company and his needs to maintain his household economy, perform distinctive roles in giving the particular shape to the Japanese experience-earnings profiles which is not easily explainable by skill-acquisition hypotheses. Funahashi (1965) and Ono (1973 b).
5. Refer to the discussion of Footnote 1 of this chapter.
6. For the concept of equity and the works related to it, see Footnote 2 of Chapter II and a brief list of works by institutional labor economists presented in Footnote 3 of Chapter I.
7. Voluminous reports of the Basic Survey of Wage Structures on prefectural distribution of wages by establishment size indicate that there exists a considerable degree of intra-prefectural variance in wages with respect to the size. This does not mean, however, that the inter-prefectural variation is small. Mizuno (1972, pp. 103-111) has found that there is a sizable inter-prefectural variance which is associated with economic variables representing demand and supply conditions. My evaluation of the cross-national difference on this point remains only speculative, since we do not have comparable empirical findings on intra-regional variation of wages between the two countries.
8. A number of research studies report on this point. This point is not a major issue in our discussion. A few studies which report on it are Formby (1968), Gwartney (1970) and Welch (1973).
9. For inter-industrial differences in the degree of employment discrimination against black workers, see an insightful investigation made by Comanor (1971).

10. On this point see for example: Slichter (1941), Slichter and others (1960), Barbash (1956, 1967 and 1973), Rees (1962), Northrup and others (1970), and Mills (1972). For Japan, see for instance: Okouchi and others (1959), Levine (1958, 1965, and 1967), and Takanashi (1967).
11. Our data clearly show a common tendency in both countries for those industries which are dominated by large establishments to be more highly unionized and vice-versa. The correlation coefficient between industry unionization rates and the employment percentage of large establishments to the total employment of that industry turned out to be .594 and .735 using the S.E.O. samples of white and non-white males respectively as weights. In the case of Japan, the comparable correlation coefficient is .748. While the data are much scarcer on intra-industry distribution of union organizations by the size of an establishment, the 1963 report of Labor Union Survey in Japan has shown the same trend within industry (Odaka 1967 a, p. 38). Various issues of Industry Wage Survey conducted by the U.S. Department of Labor reveal a similar trend within individual industries. For example, see Bureau of Labor Statistics Bulletin No. 1732 (Confectionaires), 1581 (Cigar Manufacturing), 1690 (Misc. Plastic Products), 1529 (Industrial Chemicals) and 1741 (Petroleum).

CHAPTER VI.
CONCLUDING REMARKS

The research for this dissertation had two objectives: The primary one was to develop comparable data on the shape of earnings profiles and the structure of their differentials for the United States and Japan. The secondary purpose was to interpret these empirical findings in the light of human capital and other theories pertinent to the shape and structure of earnings streams.

The primary objective was achieved by taking advantage of the large-scale national sample surveys which have been developed recently in the United States and the nation-wide earnings surveys of Japan. But the inquiry into the theoretical issues remains inconclusive, as we were unable to go beyond a speculative assessment.

From our empirical findings emerge three points of similarity and three points of dissimilarity between the earnings streams in United States and in Japan. The similarities are: (1) experience has a positive impact on earnings; (2) the effect of internal work experience is stronger than that of external experience in raising earnings; and (3) the patterns of the differentials between the white-collar and the blue-collar earnings profiles are remarkably similar.

The dissimilarities are: (1) in the United States work experience has much less effect on raising earnings than it does in Japan; (2) the effect of the interaction between education and experience on earnings is negative in the United States and positive in Japan; and (3) the differential between the earnings profiles of large-scale and small-scale industries is large during the initial phase and throughout the whole span of work experience in the United States, but in Japan it is initially very small and grows exceedingly large as experience accumulates.

These empirical findings were examined in terms of the various relevant hypotheses and the implications were explored. The human capital hypothesis appears to explain well the rise of earnings with experience in both countries. The observation that the impact of internal experience is

Japanese nenkō system have much in common with this hypothesis. Indded, it may be valuable to attempt to synthesize rigorously the human capital theory with the behavioral theoretical elements of the internal labor market hypothesis.

The human capital view also suggests interesting possible explanations of the observed patterns of interoccupational and interindustry differentials of the earnings profiles. For instance, the very similar relative differentials in earnings profiles of blue- and white-collar workers in the two countries could be taken to reflect the similar ratios of stocks of human capital held by such workers in each country. Also, it was observed that while in the United States the differential between wages in large- and small-scale industries persists throughout the entire span of workers' careers, in Japan it is almost nonexistent at the beginning stage but expands sharply as workers gain experience. A possible explanation of this finding is that the initial stock of human capital accounts for the differential in wages between large- and small-scale industries in the United States, whereas in Japan it is on-the-job training which accounts for the differential.

Again, we are not yet prepared to vouch for the validity of this view with full confidence. The similar patterns of blue- and white-collar differentials may reflect a universal social stratification in the occupational structure, as is repeatedly emphasized in the sociological literature. The consistent inter-scale differentials in the United States, which are greater among nonwhite than among white males, might be analyzed further, and perhaps more meaningfully, in terms of the social credential effect and the spatial and racial segmentation in the American labor market, rather than by attributing the differences simply to efficiency differntiation. The steeply rising profiles of Japanese workers in the large-scale industries may indeed reflect their steeply rising productivity profiles. However, do the contrasting profiles reflect a difference in the potential productive characteristics of workers in the two industrial segments, or can the difference be explained in terms of technology and productive equipment? It may be premature to conclude, on the basis of known data, that the difference resides in the characteristics of workers. If, on the other hand, it is associated with the nature of the capital equipment, competitive forces in the labor market could suppress the earnings differential to a great degree overtime. But such an outcome would depend crucially upon workers' knowledge of the labor market, and the question remains: Are they well informed about alternative jobs in a dynamic economy such as that of Japan? Yet another view is possible—perhaps the large-scale industries are paying "prestige" wages to the extent that it is permitted by their monopolistic rent. However, how the rent is shared hinges on the demand and expectations of unions and the workers themselves.

A number of other implications and speculations might be set forth, based on our empirical findings, but because of the lack of data on productivity,

greater than that of external experience in increasing earnings also seems to be compatible with the prediction of the "specific" human capital hypothesis.

But to the extent that the human capital view equates the rate of earnings with the efficiency of labor which, in turn, is deemed to be associated with the stock of human capital embodied in a worker, the observed the differences in the shape and the differential structure of earnings profiles between the two countries suggest several interesting interpretations.

For example, the observed sizable difference in the marginal effect of experience on earnings between the United States and Japan, suggests that an American worker possesses a relatively large stock of human capital at the beginning of his occupational career and that it does not increase appreciably with work experience, whereas a Japanese worker comes to his first job with very little humah capital but accumulates it rapidly as he gains work experience.

Suppose we adopt the view, as espoused by some scholars, that Japanese firms provide more specific training than do American firms, supposedly because of the lower mobility of Japanese workers and their greater commitment to their employers. Then, according to human capital theory, the productivity profiles of Japanese workers should be a great deal steeper than they would be if the same degree of specificity were assumed for training in both countries. It is already obvious that the productivity profile of Japanese workers is steeper than that of American workers, because, as we have observed, their earnings profile is steeper. But if you add the assumption that Japanese firms are providing training with greater specificity, then, the result would be a profile that is incredibly steep, as compared with the profile for American workers.

At a minimum, the difference in these observations imply that there are differences between the two countries in the nature of job training and the characteristics of premarket training such as education. The fact that there are scarcely any differentials in earnings between the highly educated Japanese workers and those with less education at the beginning stage of their work careers poses a question as to how closely earnings reflect productivity. To validate the human capital hypothesis, we need more empirical information on the productive content of training, occupational experience, and schooling as well as on worker productivity itself.

Other hypotheses may be useful in the attempt to interpret our observations. For example, it is possible that the clusters of jobs and the ladders of promotion are so structured within the internal labor market and wage policies are so administered to permit the profiles of earnings to behave as they do. While this view, known as the internal labor market hypothesis, is less rigorous theoretically than the human capital hypothesis, it appears to be more capable of offering insights into and explanations for the different behaviors of earnings profiles in the two countries. The precepts of the

worker expectations, the content of training and experience, etc., all evaluations would necessarily be tentative. The interpretations suggested in this discussion also are tentative because of the limited treatment of the subject as delineated in the first chapter, such as the avoidance of a full-fledged treatment of the issues of development and mobility.

Nevertheless, I believe that this research has achieved at least one goal: namely, to provide comparable data on experience-earnings profiles in the United States and Japan which are more reliable than any heretofore available. Because of this achievement, numerous important questions for future research efforts have been posed.

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APPENDIX A

TABLES OF REGRESSION RESULTS

1. Aggregate Earnings Equations
   Tables A-1 Through A-13

2. Blue-Collar and White-Collar Earnings Equations
   Tables A-14 Through A-20

3. Large-Scale and Small-Scale Industry Earnings Equations
   Tables A-21 Through A-31

4. Inter-Industry Analysis
   Tables A-32 Through A-43

Notes: Notations for Appendix Tables A-1 to A-43 are defined as follows:

(1) Notations of Variables

Dependent Variables

HRY (Hourly Rate of Earnings) is the rate of hourly earnings which is either directly obtained or imputed from our source data and is expressed in terms of U.S. cents.

LNHRY is natural logarithmic transformation of HRY.

HRYB is the rate of total hourly earnings which includes hourly equivalent of special payments such as bi-annual bonuses made during the year prior to the survey. This concept applies only to the Japanese earnings data. HRYB is also measured in terms of U.S. cents. The formula to compute HRYB is given in Footnote 3 on page 60.

LNHRYB is natural logarithmic transofrmation of HRYB.

Independent Variables

Ex (Gross Experience) is the number of years a worker has spent after finishing formal schooling or leaving from school up to the time of of survey.

Ex1 (Internal Experience) is the number of years a worker has spent on the current job or within the firm of current employment.

Ex 2 (External Experience) is the number of years a worker has spent on the job which is different from the current job or outside of the firm of current employment. Ex2 is computed by subtracting Ex1 from Ex.

Ex^2, $Ex1^2$ and $Ex2^2$ stand for squared values of Ex, Ex1 and Ex2 respectively.

Ed (Education) is the number of years of formal schooling. Ed^2 is its squared term.

EdEx, EdEx1 and EdEx2 represent interaction terms between formal schooling and Ex, Ex1 and Ex2 respectively.

Education dummy variables are defined beneath each table of regression results.

V is value added per employee.

K is capital stock per employee.

U is industry unionization ratio.

C is industry concentration ratio.

S is percentage employment weight of large establishments with 1000 or more workers in an industry.

Const. stands for constant term or intercept of regression equation.

For further explanation of these variables, see discussion in Chapter III. Variables which describe industry characteristics such as V, K, U, C and S will be given more explanations in footnotes to Appendix Tables C's on pages 233 and 234,

(2) For each table of regression results, the dependent variable is defined either at the end of the table heading or in the top row of the table. Independent variables are noted in the left-extreme column of the table.

(3) Figures in parentheses are t-ratios of regression oefficients. $\bar{R}^2$ stands for the coefficient of determination corrected for the degree of freedom.

(4) N stands for the size of sample. Since the Japanese source data are grouped in cells, the term "N Cells" is used to distinguish cell mean observations from individual sample observations.

Table A-1

Aggregate Earnings Equations, The United States The S.E.O. Data 1966, Males of All Age Range, All Industries. Dependent Variable is Hourly Earnings in U.S. Cents

(i) WHITE MALES SAMPLE SIZE (N) IS 5416

Ex	.82 (4.96)	11.02 (17.60)			3.29 (20.38)	10.66 (18.96)	19.79 (18.52)	14.37 (12.15)
Ex^2		−.21 (−16.86)				−.15 (−13.67)	−.22 (−16.98)	−.19 (−14.42)
Ed			20.40 (30.92)	−18.39 (−6.46)	26.16 (37.60)	24.87 (36.01)	39.22 (24.69)	−2.58 (−.59)
Ed^2				1.89 (13.99)				1.56 (10.28)
EdEx							−.56 (−10.01)	−.20 (−3.09)
Const.	325.8 (73.94)	234.2 (33.81)	124.8 (16.89)	306.9 (20.59)	−14.06 (−1.43)	−64.65 (−6.23)	−251.8 (−11.80)	22.98 (.67)
$\bar{R}^2$	.004	.054	.150	.180	.210	.237	.250	.265

(ii) NON-WHITE MALES SAMPLE SIZE (N) IS 2120

Ex	.66 (3.85)	3.88 (5.79)			2.70 (13.65)	4.96 (7.86)	11.30 (8.92)	10.66 (7.52)
Ex^2		−.06 (−4.96)				−.04 (−3.77)	−.105 (−6.69)	−.101 (−6.19)
Ed			7.50 (11.46)	−2.20 (−.86)	13.65 (17.66)	13.40 (17.32)	23.67 (12.19)	19.26 (4.06)
Ed^2				.60 (3.90)				.19 (1.02)
EdEx							−.374 (−5.76)	−.327 (−4.09)
Const.	223.9 (46.46)	192.9 (24.50)	174.7 (28.47)	206.7 (20.24)	54.41 (5.13)	35.42 (3.03)	−92.38 (−3.69)	−66.86 (−1.89)
$\bar{R}^2$	.007	.017	.058	.064	.134	.139	.152	.152

Table A-2

Aggregate Earnings Equations, Japan 1967,
Males of Total Age Range, All Industries.
Dependent Variable is Hourly Earnings in U.S. Cents. Sample Size is 91 Cells

(i) HRYB

Ex	1.24 (5.14)	4.65 (6.58)			1.75 (8.26)	5.12 (9.52)	4.44 (3.98)	1.88 (2.74)
Ex^2		−.08 (−5.06)				−.08 (−6.63)	−.08 (−5.75)	−.05 (−7.55)
Ed			4.33 (3.12)	−13.50 (−1.47)	7.59 (6.77)	7.54 (8.20)	6.75 (4.57)	−16.13 (−3.58)
Ed^2				.77 (1.96)				.79 (4.64)
EdEx							−.05 (.70)	.16 (3.20)
Const.	50.35 (10.03)	27.10 (4.24)	24.91 (1.64)	123.13 (2.35)	−39.56 (−2.85)	−62.14 (−5.21)	−52.58 (−2.89)	99.20 (3.42)
$\bar{R}^2$	.467	.621	.295	.339	.691	.805	.804	.878

(ii) HRY

Ex	.95 (6.07)	3.44 (7.89)			1.27 (9.27)	3.74 (11.56)	3.39 (5.06)	1.88 (2.74)
Ex^2		−.058 (−6.00)				−.058 (−8.07)	−.056 (−7.11)	−.054 (−7.55)
Ed			2.47 (2.61)	−9.68 (−1.54)	4.85 (6.67)	4.82 (8.69)	4.41 (4.96)	−16.13 (−3.58)
Ed^2				.528 (.08)				.795 (4.64)
EdEx							.026 (.59)	.159 (3.20)
Const.	41.67 (12.87)	24.64 (6.24)	31.13 (2.99)	98.11 (2.74)	−15.76 (−1.75)	−32.30 (−4.51)	−27.46 (−2.50)	99.20 (3.42)
$\bar{R}^2$	.532	.695	.245	.297	.719	.848	.847	.878

Table A-3

Aggregate Partial Log. Earnings Equations,
Males of Total Age Range, All Industries.
The United States; The S.E.O. Data 1966, Japan 1967.
Dependent Variable is Natural Logarithm of Hourly Earnings. (LNHR)

(i) THE UNITED STATES, UNWEIGHTED REGRESSION

	WHITE N = 5416				NON-WHITE N = 2120			
Ex		.009 (20.79)	.013 (8.44)	.067 (21.93)		.013 (14.01)	.016 (7.66)	.049 (8.68)
Ex^2				−.0007 (−20.25)				−.0004 (−6.31)
Ed	.057 (29.72)	.074 (36.67)	.083 (19.30)	.120 (26.62)	.034 (11.56)	.063 (17.98)	.074 (10.41)	.107 (12.21)
EdEx			−.0003 (−2.36)	−.002 (−12.56)			−.0004 (−1.84)	−.0017 (−5.63)
Const.	5.14 (240.7)	4.73 (166.3)	4.63 (91.60)	3.89 (63.88)	5.08 (182.7)	4.52 (94.39)	4.41 (57.79)	3.88 (34.24)
$\bar{R}^2$	.140	.204	.204	.260	.059	.138	.139	.155

(ii) JAPAN, WEIGHTED REGRESSION N = 91 CELLS

	LNHRYB				LNHRY			
Ex		.002 (10.42)	.006 (.68)	.085 (10.30)		.025 (9.59)	.007 (.72)	.095 (8.72)
Ex^2				−.0012 (−12.39)				−.0013 (−10.39)
Ed	.033 (2.11)	.075 (6.59)	.049 (2.91)	.092 (8.46)	.047 (2.59)	.093 (6.81)	.066 (3.23)	.113 (7.83)
EdEx			.0016 (2.00)	−.0011 (−2.04)			.0017 (1.73)	−.0014 (−1.89)
Const.	3.63 (20.92)	2.81 (19.81)	3.08 (15.81)	2.28 (17.01)	3.68 (18.56)	2.77 (16.40)	3.05 (13.08)	2.17 (12.11)
$\bar{R}^2$	.191	.749	.758	.919	.243	.729	.736	.891

Table A-4

Aggregate Earnings Equations, The United States, Males of Total Age Range The S.E.O. Data 1966. Dependent Variable is Hourly Earnings in U.S. Cents

	WHITE N = 5416			NON-WHITE N = 2120		
Ex	2.96 (18.25)	10.91 (19.56)	2.04 (4.48)	2.42 (12.43)	5.86 (9.13)	1.84 (3.37)
Ex^2		−.16 (−14.88)			−.07 (−5.62)	
LE	−39.87 (−5.16)	−33.07 (−4.36)	−27.62 (−1.25)	−41.58 (−5.78)	−37.35 (−5.20)	−47.98 (−2.36)
LH	55.02 (8.14)	46.96 (7.07)	33.44 (1.90)	17.93 (2.38)	19.78 (2.64)	.43 (.02)
H	86.98 (13.24)	82.36 (12.77)	53.47 (3.26)	57.52 (7.23)	63.18 (7.93)	23.41 (1.25)
LC	142.67 (17.16)	137.45 (16.84)	80.57 (4.21)	72.42 (6.28)	75.24 (6.56)	85.46 (3.30)
CM	287.60 (32.14)	287.03 (31.62)	223.80 (10.66)	191.74 (9.11)	194.93 (9 32)	154.24 (3.38)
LE Ex			−.31 (−.49)			.28 (.44)
LH Ex			.62 (1.11)			.63 (.95)
H Ex			1.16 (2.20)			1.71 (2.43)
HC Ex			2.70 (3.87)			−1.13 (−.98)
CM Ex			2.88 (3.40)			1.90 (.79)
CONST.	200.87 (27.06)	135.02 (15.85)	229.75 (15.08)	171.03 (20.81)	134.38 (12.86)	187.41 (11.22)
$\bar{R}^2$	.227	.258	.231	.135	.147	.137

Note: Education dummies correspond to accumulated years of schooling as follows: LE = 0 to 7 years, Base Group = 8, LH = 9 to 11, H = 12, LC = 13 to 15, CM = 16 to 20.

Table A-5

Aggregate Earnings Equations The United States, Males of Total Age Range The S.E.O. Data 1966. Dependent Variable is Hourly Earnings in U.S. Cents

	WHITE N = 5416				NON-WHITE N = 2120			
Ex	2.72 (16.86)	11.05 (19.60)	1.92 (7.43)	12.12 (16.50)	2.34 (12.23)	5.73 (8.97)	2.07 (7.01)	6.47 (8.11)
Ex^2		−.17 (−15.39)		−.19 (−14.80)		−.06 (−5.56)		−.09 (−5.94)
LE	−74.62 (−11.46)	−62.22 (−9.68)	−62.82 (−3.53)	−118.82 (−6.65)	−52.81 (−9.66)	−49.74 (−9.12)	−51.99 (−3.75)	−94.90 (−6.11)
HM	60.98 (13.71)	61.83 (14.20)	24.89 (2.66)	71.68 (7.39)	47.44 (8.62)	51.21 (9.29)	28.61 (2.65)	46.70 (4.20)
CM	249.24 (32.34)	245.10 (32.47)	188.59 (11.44)	237.96 (14.42)	178.96 (8.79)	180.80 (8.94)	150.24 (3.47)	161.71 (3.76)
LE EX			−.19 (−.37)	1.75 (3.31)			.06 (.14)	1.55 (3.09)
HM EX			1.57 (4.42)	−.52 (−1.38)			1.06 (2.12)	.12 (.23)
CM EX			3.00 (3.89)	.36 (.47)			1.67 (.71)	.98 (.42)
CONST.	243.34 (45.17)	168.29 (23.43)	264.95 (34.72)	158.92 (15.34)	189.19 (33.09)	150.43 (17.98)	191.42 (25.11)	150.19 (14.63)
$\bar{R}^2$	.208	.242	.213	.243	.132	.144	.133	.147

Notes: (1) Education dummies correspond to accumulated years of schooling as follows: LE = 0 to 7 years, Base Group = 8 to 11.
HM = 12 to 15, and CM = 16 to 20

(2) LE EX, HM EX and CM EX stand for interaction terms of LE, HM and CM with experience EX.

Table A-6

Aggregate Earnings Equations, Japan 1967, Males of Total Age Range. Dependent Variable is Hourly Earnings in The U.S. Cents, N = 91 Cells

	HRYB				HRY			
Ex	1.59 (7.56)	5.29 (10.22)	1.09 (4.59)	4.57 (8.42)	1.17 (8.51)	3.85 (12.51)	.82 (5.36)	3.40 (10.60)
Ex^2		−.085 (−7.53)		−.076 (−6.86)		−.061 (−9.20)		−.056 (−8.58)
H	18.08 (3.33)	20.95 (4.92)	−.37 (−.05)	10.86 (1.61)	10.85 (3.08)	12.94 (5.12)	−1.91 (−.36)	6.38 (1.61)
J	60.92 (4.14)	55.87 (4.85)	33.40 (1.01)	29.76 (1.12)	39.16 (4.09)	35.50 (5.19)	21.16 (.99)	18.47 (1.18)
C	53.06 (5.87)	57.02 (8.06)	9.00 (.68)	24.72 (2.28)	33.97 (5.79)	36.84 (8.77)	5.70 (.67)	17.31 (2.70)
H Ex			1.15 (2.66)	.58 (1.63)			.80 (2.86)	.38 (1.81)
J Ex			1.27 (.94)	1.22 (1.12)			.83 (.95)	.79 (1.23)
C Ex			3.90 (4.01)	2.88 (3.63)			2.48 (3.94)	1.73 (3.70)
CONST.	31.95 (5.89)	4.97 (.90)	42.47 (7.45)	14.35 (2.34)	30.27 (8.60)	10.70 (3.25)	37.37 (10.12)	16.61 (4.58)
$\bar{R}^2$	.697	.829	.758	.852	.723	.870	.779	.888

Notes: (1) Education dummies corresponds to accumulated years of schooling as follows: Base Group = 9 years, H = 12, J = 14, C = 16
(2) H Ex, J Ex and C Ex stand for interaction terms of H. J and C with experience Ex.

Table A-7

Aggregate Earnings Equations, The United States, The Parnes Data 1966, Males of Age 45 to 59. Dependent Variable is Hourly Earnings in U.S. Cents.

	WHITE N = 1513				NON-WHITE N = 553			
Ex 1	2.73 (3.22)	1.69 (1.08)	8.43 (3.26)	.92 (.31)	1.45 (1.56)	1.54 (.92)	.82 (.39)	1.07 (.39)
$Ex\ 1^2$		.014 (.38)		.08 (2.11)		.007 (.14)		.04 (.84)
Ex 2	.66 (.77)	−2.20 (−1.23)	12.07 (4.82)	9.61 (2.53)	−1.18 (−1.26)	1.80 (.77)	−.90 (−.43)	6.67 (1.77)
$Ex\ 2^2$		.056 (1.61)		−.06 (−1.50)		−.06 (−1.33)		−.11 (−2.11)
Ed	20.40 (13.82)	20.02 (13.48)	51.74 (6.44)	.56 (.05)	4.74 (3.42)	4.89 (3.51)	4.24 (.50)	19.34 (1.47)
Ed^2				1.66 (5.91)				−.38 (−1.17)
Ed Ex 1			−.58 (−2.42)	−.05 (−.20)			.10 (.39)	−.05 (−.18)
Ed Ex 2			−1.17 (−4.96)	−.62 (−2.27)			−.03 (−.12)	−.34 (−1.17)
CONST.	83.33 (2.14)	124.9 (2.91)	−232.2 (−2.58)	71.56 (.64)	209.6 (5.41)	174.4 (3.90)	210.3 (2.78)	70.87 (.74)
$\bar{R}^2$	.171	.173	.193	.214	.102	.103	.100	.106

Table A-8

Aggregate Earnings Equations, The United States, The Parnes Data 1966, Males of Age 45 to 59. Dependent Variable is Natural Logarithm of Hourly Earnings

	WHITE N = 1513				NON-WHITE N = 553			
Ex 1	.007 (2.94)	.009 (2.01)	.021 (2.95)	.020 (2.52)	.007 (1.75)	.009 (1.27)	.004 (.42)	.003 (.28)
Ex 1^2		−.000 (−.61)		.000 (.42)		−.000 (−.04)		.0001 (.60)
Ex 2	−.0007 (−.30)	−.004 (−.87)	.019 (2.77)	.025 (2.45)	−.006 (−1.44)	.013 (1.25)	−.007 (−.70)	.029 (1.77)
Ex 2^2		.000 (.86)		−.000 (−.73)		−.0004 (−1.88)		−.0006 (−2.54)
Ed	.053 (12.90)	.053 (12.78)		.117 (5.10)	.023 (3.70)	.024 (3.85)	.015 (.39)	.035 (.90)
Ed Ex 1			−.001 (−2.14)	−.001 (−2.16)			.0005 (.42)	.0005 (.44)
Ed Ex 2			−.002 (−3.09)	−.002 (−3.16)			.0001 (.09)	−.0007 (.62)
CONST.	5.13 (47.58)	5.15 (43.38)	4.51 (17.96)	4.45 (16.65)	5.25 (30.05)	5.02 (24.97)	5.30 (15.53)	4.81 (12.64)
$\bar{R}^2$	.180	.179	.185	.184	.125	.132	.123	.134

Table A-9

Aggregate Earnings Equations, Japan 1967, All Industries, Males of Age 40 to 59, Dependent Variable is Hourly Earnings in U.S. Cents N = 195 Cells

	Dependent Variable is HRY				Dependent Variable is LNHRY			
Ex 1	1.25 (10.64)	1.54 (6.49)	−1.41 (−2.49)	−1.39 (−2.51)	.015 (10.24)	.023 (8.52)	.013 (1.64)	.017 (2.38)
Ex 1^2		−.005 (−.72)		.0028 (.49)		−.0002 (−2.01)		−.0001 (−1.69)
Ex 2	−.159 (−1.52)	.596 (2.30)	−1.66 (−3.34)	−.271 (−.52)	−.0048 (−3.59)	.010 (4.16)	−.0097 (−1.46)	.010 (1.56)
Ex 2^2		−.172 (−3.54)		−.023 (−5.35)		−.0003 (−6.20)		−.0004 (−6.17)
Ed	5.86 (20.18)	5.99 (21.46)	−21.52 (−5.68)	−19.27 (−5.50)	.069 (18.69)	.072 (22.56)	.058 (3.02)	.062 (3.77)
Ed^2			.933 (7.32)	.865 (7.35)				
EdEx 1			.266 (4.78)	.273 (5.33)			.0003 (.36)	.0006 (.94)
EdEx 2			.147 (3.05)	.108 (2.40)			.0005 (.75)	.0001 (.22)
CONST.	−1.20 (−.22)	−11.25 (−2.01)	177.4 (6.69)	152.1 (6.15)	3.43 (49.85)	3.21 (50.23)	3.54 (17.28)	3.30 (18.66)
$\bar{R}^2$	.931	.937	.949	.957	.939	.956	.938	.956

Table A-10

Agtregare Earnings Equations, Japan 1967,
All Industries, Males of Total Age Range,
Dependent Variable is Hourly Earnings in U.S. Cents N = 91 Cells

	Dependent Variable is HRYB				Dependent Variable is LNHRYB			
Ex 1	4.93 (18.95)	7.05 (5.98)	−4.19 (−4.78)	−3.88 (−4.36)	.063 (19.97)	.14 (14.27)	.009 (.64)	.086 (6.09)
Ex 1^2		−.099 (−2.07)		−.017 (−.76)		−.004 (−8.80)		−.003 (−8.54)
Ex 2	.058 (.34)	.42 (.73)	1.78 (4.29)	1.24 (2.20)	.004 (1.97)	.009 (1.95)	.020 (2.86)	.045 (5.99)
Ex 2^2		−.015 (−1.07)		−.032 (−4.51)		−.0003 (−2.76)		−.0006 (−5.38)
Ed	5.70 (8.79)	5.68 (8.45)	.098 (.13)	−21.72 (−8.43)	.070 (8.85)	.066 (11.82)	.041 (3.18)	.059 (7.30)
Ed^2				.91 (8.97)				
EdEx 1			.87 (10.63)	.84 (15.41)			.005 (3.67)	.004 (4.47)
EdEx 2			−.17 (−4.20)	−.021 (−.54)			−1.66 (−2.33)	−.003 (−5.50)
CONST.	−30.89 (−3.91)	−39.12 (4.72)	28.78 (3.40)	151.1 (9.36)	2.88 (29.92)	2.63 (37.90)	3.18 (21.92)	2.73 (28.92)
$\bar{R}^2$	.913	.913	.963	.985	.922	.966	.932	.976

Table A-11

Aggregate Earnings Equations, Japan 1967, All Industries, Males of Total Age Range,
Dependent Variable is Hourly Earnings in U.S. Cents N = 91 Cells

	Dependent Variable is HRY				Dependent Variable is LNHRY			
Ex 1	3.32 (19.49)	4.61 (6.30)	−2.09 (−3.25)	−1.88 (−3.51)	.0537 (18.89)	.112 (13.19)	.0089 (.65)	.0626 (5.21)
Ex 1^2		−.067 (−2.25)		−.018 (−1.38)		−.0028 (−8.04)		−.0023 (−7.68)
Ex 2	.18 (1.61)	.941 (2.63)	.995 (3.28)	1.23 (3.62)	.0058 (3.11)	.0193 (4.64)	.0157 (2.43)	.050 (7.78)
Ex 2^2		−.025 (−2.77)		−.034 (−7.95)		.0005 (−5.01)		−.0007 (7.88)
Ed	3.63 (8.53)	3.80 (9.11)	.160 (.29)	−14.75 (−9.52)	.0568 (8.01)	.0573 (11.83)	.0303 (2.56)	.049 (7.19)
Ed^2				.633 (10.36)				
EdEx 1			.513 (8.58)	.502 (15.24)			.0043 (3.34)	.0035 (4.72)
EdEx 2			−.082 (−2.68)	.004 (.17)			−.0010 (−1.55)	−.0022 (−5.54)
CONST.	−10.17 (−1.97)	−18.69 (5.14)	26.83 (4.32)	107.8 (11.10)	2.89 (33.51)	2.64 (44.22)	3.17 (23.92)	2.74 (34.00)
$\bar{R}^2$	.917	.931	.955	.933	.916	.966	.925	.977

Table A-12

Aggregate Earnings Equations, The United States, The Parnes Data 1966, Males of Age 45 to 59. Dependent Variable is Hourly Earnings in U.S. Cents

	WHITE N = 1513			NON-WHITE N = 553		
Ex 1	1.72 (2.09)	−.02 (−.02)	−1.95 (−1.11)	1.49 (1.61)	.032 (.02)	−.21 (−.09)
$Ex\ 1^2$			.06 (1.41)			.017 (.35)
Ex 2	−.49 (−.59)	−1.56 (−1.35)	−.68 (−.30)	−1.15 (−1.26)	−2.73 (−1.84)	.74 (.28)
$Ex\ 2^2$			−.023 (−.57)			−.076 (−1.51)
LE	−27.30 (−2.76)	−146.2 (−1.70)	−147.0 (−1.71)	−25.52 (−2.96)	−89.20 (−1.28)	−107.7 (−1.52)
HM	41.94 (4.81)	47.13 (.74)	54.16 (.84)	16.52 (1.22)	−215.44 (−1.88)	−216.9 (−1.89)
CM	279.02 (15.86)	−23.16 (−.22)	−.62 (−.006)	49.30 (1.19)	−2.69 (−.01)	−15.04 (−.07)
LE Ex 1		3.04 (1.30)	3.01 (1.29)		1.75 (.90)	1.89 (.96)
HM Ex 1		.24 (.13)	.13 (.07)		6.85 (1.81)	7.17 (1.88)
CM Ex 1		13.95 (4.17)	13.30 (3.94)		6.93 (.73)	7.59 (.79)
LE Ex 2		3.20 (1.39)	3.25 (1.41)		1.83 (.93)	2.52 (1.25)
HM Ex 2		−.74 (−.38)	−1.06 (−.53)		7.43 (2.12)	7.36 (2.09)
CM Ex 2		5.70 (1.55)	4.79 (1.26)		−.29 (−.04)	.08 (.01)
CONST.	301.4 (10.21)	349.4 (8.47)	353.5 (7.79)	254.4 (7.91)	308.1 (6.04)	274.2 (5.03)
$\bar{R}^2$	.207	.228	.228	.104	.104	.106

Table A-13

Aggregate Earnings Equations, Japan, Males,
Dependent Variable is Hourly Earnings in U.S. Cents

	AGE RANGE 40 TO 59				ALL AGE RANGE					
	Dep. Var. is HRY				Dep. Var. is HRYB			Dep. Var. is HRY		
Ex 1	1.40	1.67	1.19	1.35	6.74	3.88	4.14	4.40	2.69	2.89
	(11.42)	(6.53)	(9.55)	(5.83)	(6.59)	(28.11)	(9.22)	(7.17)	(23.67)	(10.39)
$Ex\ 1^2$		−.006		−.002	−.091		−.02	−.061		−.02
		(−.82)		(−.26)	(−2.19)		(−1.34)	(−2.45)		(−2.06)
Ex 2	−.23	.29	−.37	.39	.59	−.18	.86	1.06	−.021	1.16
	(−2.10)	(1.18)	(−3.19)	(1.63)	(1.13)	(−2.14)	(3.83)	(3.37)	(−.32)	(8.29)
$Ex\ 2^2$		−.012		−.017	−.023		−.028	−.030		−.03
		(−2.16)		(−3.33)	(−1.81)		(−5.41)	(−3.88)		(−9.83)
H	11.08	11.64	.24	2.11	12.67	−2.72	.24	8.48	−3.07	.24
	(7.71)	(8.36)	(.03)	(.28)	(4.46)	(−1.22)	(.13)	(4.97)	(−1.67)	(.21)
J	33.84	33.88	5.74	7.61	46.12	−14.99	−14.60	30.63	−7.14	−6.56
	(11.54)	(12.02)	(.36)	(.52)	(6.58)	(−1.55)	(−1.84)	(7.19)	(−.90)	(−1.34)
C	49.15	49.75	−19.72	−15.89	46.27	−5.29	−1.33	31.08	−1.74	2.65
	(15.54)	(16.29)	(−1.25)	(−1.09)	(10.08)	(−1.41)	(−.43)	(11.27)	(−.57)	(1.37)
H Ex 1			.49	.53		1.36	1.34		.84	.82
			(1.67)	(1.94)		(5.70)	(6.77)		(4.27)	(6.74)
J Ex 1			1.19	1.16		4.85	5.01		2.78	2.96
			(1.88)	(1.99)		(7.62)	(9.64)		(5.31)	(9.20)
C Ex 1			3.13	3.09		6.96	6.89		4.02	3.97
			(4.66)	(4.98)		(14.71)	(17.39)		(10.32)	(16.16)
H Ex 2			.22	.12		.46	.35		.41	.28
			(.84)	(.48)		(2.78)	(2.54)		(2.99)	(3.30)
J Ex 2			.84	.76		.55	.43		.48	.35
			(1.48)	(1.43)		(1.42)	(1.35)		(1.53)	(1.77)
C Ex 2			2.25	2.06		.12	−.068		.29	.18
			(3.66)	(3.61)		(.29)	(−.20)		(1.16)	(.85)
CONST.	54.33	47.69	59.69	51.45	13.74	32.66	27.22	16.61	30.82	24.99
	(14.30)	(11.27)	(15.40)	(12.56)	(3.61)	(21.48)	(15.43)	(7.26)	(24.63)	(22.89)
$\bar{R}^2$	.964	.967	.971	.976	.941	.986	.991	.953	.979	.992

Table A-14

Blue VS. White-Collar Earnings Equations, The United States, Males of Total Age Range The S.E.O. Data 1966, Manufacturing Industries

(i) BLUE-COLLAR

	WHITE N = 2195				NON-WHITE N = 966			
	HRY		LNHRY		HRY		LNHRY	
Ex	2.56	16.34	.0086	.057	2.84	10.01	.013	.053
	(13.79)	(12.18)	(13.98)	(13.08)	(10.17)	(5.32)	(10.86)	(6.24)
Ex^2		−.17		−.000		−.077		−.0004
		(−11.87)		(−12.54)		(−3.22)		(−3.85)
Ed	17.97	30.53	.061	.109	12.10	22.89	.061	.124
	(19.64)	(13.43)	(20.21)	(14.50)	(10.80)	(7.62)	(12.03)	(9.20)
Ed Ex		−.495		−.0019		−.381		−.0022
		(−6.56)		(−7.46)		(−3.91)		(−5.08)
CONST.	79.66	−131.8	4.89	4.112	74.67	−63.53	4.57	3.79
	(6.63)	(−4.61)	(122.8)	(43.62)	(4.97)	(−1.69)	(67.49)	(22.42)
$\bar{R}^2$	.160	.210	.167	.222	.126	.139	.146	.167

(ii) WHITE COLLAR

	WHITE N = 912				NON-WHITE N = 94			
	HRY		LNHRY		HRY		LNHRY	
Ex	5.91	19.76	.012	.059	2.27	16.43	.0075	.0486
	(9.58)	(4.43)	(11.14)	(7.58)	(2.20)	(2.66)	(2.31)	(2.47)
Ex^2		−.265		−.0007		−.154		−.0004
		(−5.11)		(−8.10)		(−2.18)		(−1.95)
Ed	41.37	41.82	.089	.105	26.65	41.89	.085	.130
	(16.10)	(7.41)	(19.52)	(10.78)	(7.20)	(4.53)	(7.20)	(4.39)
Ed Ex		−.132		−.001		−.635		−.0019
		(−.59)		(−2.64)		(−1.85)		(−1.71)
CONST.	−202.7	−312.7	4.63	4.12	−53.17	−292.5	4.49	3.79
	(−4.99)	(−3.67)	(64.47)	(27.95)	(−.98)	(−2.31)	(25.95)	(9.39)
$\bar{R}^2$	.234	.256	.308	.353	.350	.375	.350	.368

Note: HRY and LNHRY in the top row of each table denote that the dependent variable is hourly rate of earnings in U.S. cents and natural logarithm of HRY, respectively.

Table A-15

Blue Vs. White-Collar Earnings Equations, Japan 1967, Males of Total Age Range, Manufacturing Industries. Dependent Variable is Hourly Earnings in U.S. Cents

(i) BLUE-COLLAR N = 50 Cells

	HRYB				HRY			
	HRYB		LNHRYB		HRY		LNHRY	
Ex	1.09 (5.59)	4.43 (2.80)	.019 (5.99)	.091 (4.23)	.89 (6.21)	3.54 (3.25)	.019 (6.63)	.087 (5.02)
Ex^2		−.66 (−6.08)		−.001 (−8.71)		−.052 (−6.90)		−.001 (−10.01)
Ed	2.78 (1.54)	4.14 (1.88)	.053 (1.78)	.088 (2.94)	2.03 (1.53)	3.14 (2.07)	.047 (1.81)	.081 (3.40)
Ed Ex		−.054 (−.37)		−.002 (−.89)				−.002 (−1.14)
CONST.	14.49 (.76)	−17.61 (− 77)	3.19 (10.17)	2.48 (7.93)	15.90 (1.14)	−9.71 (−.61)	3.10 (11.32)	2.43 (9.72)
$\bar{R}^2$	.607	.801	.636	.877	.651	.843	.675	.908

(ii) WHITE-COLLAR N = 91 Cells

	HRYB				HRY			
	HRYB		LNHRYB		HRY		LNHRY	
Ex	2.16 (8.49)	4.65 (3.53)	.026 (9.84)	.097 (9.68)	1.55 (9.42)	3.68 (4.69)	.024 (10.56)	.088 (11.49)
Ex^2		−.101 (−7.02)		−.002 (−13.84)		−.073 (−8.52)		−.001 (−16.18)
Ed	7.69 (6.32)	5.13 (3.29)	.087 (6.91)	.096 (8.07)	5.06 (6.42)	3.65 (3.93)	.075 (6.88)	.083 (9.15)
Ed Ex		.168 (2.06)		−.0005 (−.77)		.093 (1.91)		−.0005 (1.03)
CONST.	−45.65 (−2.65)	−45.56 (−2.11)	2.85 (15.95)	2.29 (13.93)	−21.36 (−1.92)	−26.70 (−2.07)	2.82 (18.40)	2.31 (18.35)
$\bar{R}^2$	.683	.845	.731	.931	.713	.882	.750	.949

Table A-16

Blue-Collar Earnings Equations, The United States,
The Parnes Data 1966 Males of Age 45 to 59, Manufacturing Industries
Dependent Variable is Hourly Earnings in U.S. Cents

	WHITE: N = 664			NON-WHITE N = 292			
	HRY		LNHRY	HRY		LNHRY	
Ex 1	1.31 (1.51)	1.25 (.33)	.0044 (1.54)	2.81 (2.75)	10.47 (3.22)	.012 (2.44)	.039 (2.59)
Ex 1^2		.02 (.52)			−.125 (−2.32)		−.0005 (−1.95)
Ex 2	−.68 (−.79)	3.27 (.73)	−.0030 (−1.06)	−.60 (−.58)	7.62 (1.77)	−.004 (−.76)	.036 (1.78)
Ex 2^2		−.017 (−.39)			−.055 (−.98)		−.0005 (−1.65)
Ed	10.30 (6.12)	25.04 (1.35)	.037 (6.71)	6.65 (4.49)	34.30 (2.26)	.031 (4.28)	.081 (1.54)
Ed^2		−.36 (−.73)			−.59 (−1.60)		
Ed Ex 1		−.08 (−.22)			−.391 (−1.18)		−.0007 (−.47)
Ed Ex 2		−.35 (−.96)			−.66 (−1.89)		−.0019 (−1.23)
CONST.	200.9 (4.92)	94.12 (.62)	5.31 (39.22)	157.7 (3.66)	−86.1 (−.75)	5.06 (23.87)	4.20 (8.32)
$\bar{R}^2$	.126	.125	.155	.237	.287	.222	.277

Table A-17

White-Collar Earnings Equations, The United States,
The Parnes Data 1966, Males of Age 45 to 59, Manufacturing Industries
Dependent Variable is Hourly Earnings in U.S. Cents

	WHITE: N = 247				NON-WHITE: N = 16	
	HRY		LNHRY		HRY	LNHRY
Ex 1	6.69 (1.82)	−18.35 (−1.46)	.0089 (1.47)	.0006 (.02)	−7.23 (−.91)	−.031 (−.88)
Ex 1^2		.383 (2.24)		.00055 (1.86)		
Ex 2	3.85 (.95)	17.44 (1.98)	.0031 (.47)	.059 (1.93)	−13.47 (−1.31)	−.056 (−1.24)
Ex 2^2		−.442 (−2.01)		−.00087 (−2.24)		
Ed	46.64 (6.79)		.082 (7.24)	.128 (2.37)	−6.42 (−.52)	−.031 (−.56)
Ed^2						
Ed Ex 1		.871 (1.42)		−.0007 (−.46)		
Ed Ex 2				−.0021 (−1.19)		
CONST.	−277.2 (−1.48)		4.83 (15.55)		634.3 (1.54)	7.12 (3.89)
$\bar{R}^2$	.200	.210	.237	.242	.053	.000

Table A-18

Blue Vs. White-Collar Earnings Equations, Japan 1967,
Males of Age 40 to 59, Manufacturing Industries
Dependent Variable is Hourly Earnings in U.S. Cents

	BLUE-COLLAR: N = 34 CELLS				WHITE-COLLAR: N = 63 CELLS			
	HRY		LNHRY		HRY		LNHRY	
Ex 1	1.02 (9.34)	1.89 (2.53)	.014 (6.81)	.036 (3.69)	1.85 (10.50)	−1.93 (−3.57)	.019 (9.71)	.022 (3.27)
Ex 1^2		−.016 (−3.65)		−.0004 (−6.27)		.011 (1.79)		−.0001 (−1.39)
Ex 2	−.447 (−4.55)	.67 (1.04)	−.008 (−4.22)	.012 (1.48)	.095 (.59)	−1.25 (−2.54)	−.002 (−1.29)	.005 (.84)
Ex 2^2		−.010 (−2.92)		−.0002 (−5.33)		−.027 (−5.62)		−.0004 (−5.97)
Ed	1.36 (2.63)	3.03 (1.49)	.019 (1.94)		6.33 (16.64)		.067 (15.57)	.054 (3.97)
Ed^2								
Ed Ex 1		−.030 (−.39)		−.0008 (−.83)		.320 (7.54)		.0003 (.62)
Ed Ex 2		−.067 (−1.01)		−.0009 (−1.13)		.209 (5.36)		.0008 (1.64)
CONST.	50.04 (7.72)	25.99 (1.35)	3.98 (31.79)	3.52 (14.52)	−13.09 (−1.59)	188.1 (8.26)	3.43 (36.00)	3.42 (1.64)
$\bar{R}^2$	.981	.993	.970	.995	.962	.989	.966	.985

Table A-19

Blue-Collar Earnings Equations Japan 1967,
Males of All Age Range N = 51 Cells, Manufacturing Industries
Dependent Variable is Hourly Earnings in U.S. Cents

	HRYB				HRY			
	HRYB		LNHRYB		HRY		LNHRY	
Ex 1	4.56 (30.59)	6.96 (7.19)	.071 (15.16)	.199 (7.95)	3.40 (26.32)	5.27 (6.24)	.063 (14.75)	.173 (7.46)
Ex 1^2		−.113 (−7.49)		−.0044 (−11.11)		−.075 (−5.67)		−.0035 (−9.69)
Ex 2	−.30 (−3.86)	−.97 (−2.09)	−.0012 (−.49)	−.012 (−.97)	−.11 (−1.68)	−.366 (−.90)	.0010 (.47)	−.0008 (−.07)
Ex 2^2		−.011 (−2.63)		−.0002 (−2.37)		−.018 (−5.03)		−.0004 (−4.31)
Ed	2.72 (5.60)	2.34 (4.87)	.052 (3.44)	.070 (5.58)	1.99 (4.72)		.047 (3.34)	.069 (5.95)
Ed Ex 1		−.015 (−.18)		−.0042 (−1.99)		−.058 (−.82)		−.0044 (−2.26)
Ed Ex 2		.093 (2.21)		.0013 (1.20)		.083 (2.25)		.0012 (1.17)
CONST.	2.33 (.46)	−1.95 (−.39)	3.012 (18.78)	2.55 (19.39)	7.11 (1.60)	.74 (.17)	2.95 (20.12)	2.48 (20.45)
$\bar{R}^2$	.977	.994	.920	.986	.971	.992	.920	.985

Table A-20

White-Collar Earnings Equations Japan 1967,
Males of All Age Range N = 91 Cells, Manufacturing Industries
Dependent Variable is Hourly Earnings in U.S. Cents

	HRYB				HRY			
	HRYB		LNHRYB		HRY		LNHRY	
Ex 1	6.03 (22.29)	−6.96 (−6.44)	.067 (26.25)	.079 (7.74)	4.05 (23.09)	−3.33 (−4.58)	.058 (24.08)	.064 (16.43)
Ex 1^2		.077 (3.40)		−.002 (−9.15)		.039 (2.59)		−.002 (−7.19)
Ex 2	.11 (.58)	1.76 (2.48)	.004 (2.37)	.026 (4.23)	.22 (1.90)	1.56 (3.27)	.006 (3.51)	.032 (5.35)
Ex 2^2		−.046 (−4.99)		−.0007 (−7.77)		−.045 (−7.20)		−.0008 (−9.64)
Ed	7.25 (11.82)	−17.36 (−4.61)	.083 (14.21)	.064 (11.70)	4.77 (11.98)	−9.25 (−3.65)	.070 (12.85)	.058 (10.91)
Ed^2		.68 (4.86)				.39 (4.14)		
Ed Ex 1		.92 (14.64)		.0025 (4.31)		.515 (12.13)		.002 (3.45)
Ed Ex 2		.002 (.042)		−.0002 (−.54)		.024 (.79)		−.0001 (−.27)
CONST.	−60.37 (−6.93)	139.1 (5.52)	2.69 (32.64)	2.71 (36.06)	−30.88 (−5.46)	81.34 (4.79)	2.69 (34.48)	2.67 (36.69)
$\bar{R}^2$	.930	.983	.950	.988	.935	.983	.942	.985

Table A-21

Large-Scale Vs. Small-Scale Industry Earnings Equations, The United States, The S.E.O. Data 1966, Males of Total Age Range, Manufacturing Industries Dependent Variable is Hourly Earnings in U.S. Cents

(i) LARGE-SCALE INDUSTRY BLOCK

	WHITE: N = 2016				NON-WHITE: N = 601			
	HRY		LNHRY		HRY		LNHRY	
Ex	3.87 (14.22)	19.92 (11.03)	.0099 (15.60)	.057 (13.81)	2.57 (6.71)	11.17 (4.21)	.0093 (6.57)	.0417 (4.24)
Ex^2		−.211 (−9.66)		−.0006 (−12.45)		−.087 (−2.83)		−.0003 (−2.94)
Ed	31.77 (28.40)	43.49 (17.24)	.078 (30.00)	.113 (19.44)	11.72 (8.16)	24.99 (5.96)	.044 (8.21)	.092 (5.91)
Ed Ex		−.538 (−5.89)		−.0016 (−7.55)		−.435 (−3.40)		−.0002 (−3.35)
CONST.	−65.77 (−3.94)	−290.9 (−8.24)	4.76 (122.4)	4.09 (50.53)	113.5 (5.33)	−66.20 (−1.17)	4.95 (62.68)	4.29 (20.46)
$\bar{R}^2$	.287	.318	.311	.360	.103	.117	.103	.117
$\bar{Y}$	mean HRY = 383				mean HRY = 287			

(ii) SMALL-SCALE INDUSTRY BLOCK

	WHITE: N = 1152				NON-WHITE: N = 516			
	HRY		LNHRY		HRY		LNHRY	
Ex	3.57 (9.42)	20.25 (2.62)	.0096 (10.12)	.065 (10.05)	1.891 (5.66)	8.86 (4.12)	.0107 (6.34)	.0416 (3.82)
Ex^2		−.237 (−7.62)		−.0008 (−9.86)		−.081 (−2.94)		−.0003 (−2.29)
Ed	30.19 (18.25)	41.76 (10.33)	.082 (19.79)	.125 (12.53)	13.28 (9.86)	22.43 (6.88)	.0718 (10.52)	.1187 (7.18)
Ed Ex		−.502 (−3.55)		−.0018 (−5.22)		−.352 (−3.09)		−.0018 (−3.12)
CONST.	−63.66 (−2.81)	−290.2 (−5.53)	4.62 (81.38)	3.84 (29.61)	55.87 (3.24)	−64.59 (−1.59)	4.39 (50.34)	3.92 (18.62)
$\bar{R}^2$	.226	.263	.255	.312	.157	.171	.176	.188
$\bar{Y}$	mean HRY = 330				mean HRY = 213			

Table A-22

Large-Scale Vs. Small-Scale Industry Earnings Equations, Japan 1967, Males of Total Age Range, Manufacturing Industries. Dependent Variable is Hourly Earnings in U.S. Cents

(i) LARGE-SCALE INDUSTRY BLOCK N = 66 CELLS

	HRYB		LNHRYB		HRY		LNHRY	
Ex	3.65 (16.18)	−1.47 (−1.31)	.045 (17.69)	.025 (2.14)	2.61 (16.85)	−.22 (−.27)	.041 (17.57)	.027 (2.46)
Ed	9.83 (19.05)	−6.04 (−1.11)	.118 (20.35)	.093 (5.76)	6.46 (18.25)	−1.78 (−.45)	.099 (18.67)	.080 (5.45)
Ed^2		.39 (2.06)				.19 (1.40)		
Ed Ex		.49 (4.68)		.002 (1.71)		.27 (3.58)		.001 (1.32)
CONST.	−90.95 (−10.83)	34.69 (.90)	2.27 (23.99)	2.54 (13.86)	−51.96 (−9.00)	14.31 (.51)	2.36 (27.41)	2.55 (15.16)
$\bar{R}^2$	.925	.944	.934	.936	.923	.935	.927	.928
$\bar{Y}$	mean HRYB = 72.7				mean HRY = 59.1			

(ii) SMALL-SCALE INDUSTRY BLOCK N = 54 CELLS

	HRYB		LNHRYB		HRY		LNHRY	
Ex	1.81 (7.00)	−4.15 (−3.35)	.025 (6.39)	.051 (1.20)	1.29 (7.21)	−2.79 (−3.25)	.022 (6.66)	.048 (1.35)
Ex^2				−.001 (−1.75)				−.001 (−1.91)
Ed	7.50 (11.70)	−17.45 (−2.83)	.106 (10.85)	.087 (2.56)	5.04 (11.28)	−12.40 (−2.91)	.087 (10.56)	.074 (2.57)
Ed^2		.71 (3.30)				.50 (3.36)		
Ed Ex		.56 (4.82)		.002 (1.07)		.39 (4.76)		.002 (1.03)
CONST.	−49.79 (−4.85)	134.5 (3.14)	2.53 (16.32)	2.30 (4.17)	−24.64 (−3.47)	103.6 (3.49)	2.61 (19.92)	2.37 (5.11)
$\bar{R}^2$	.846	.896	.830	.851	.838	.891	.822	.846
$\bar{Y}$	mean HRYB = 58.7				mean HRY = 49.4			

Table A-23

Large-Scale Industry Earnings Equations, The United States, The Parnes Data 1966, Males of Age 45 to 59, Manufacturing Industries. Dependent Variable is Hourly Earnings in U.S. Cents

	WHITE: N = 537				NON-WHITE: N = 163			
	HRY		LNHRY		HRY		LNHRY	
Ex 1	5.306 (3.81)	−16.83 (−3.43)	.0095 (3.11)	.0208 (2.20)	1.938 (1.54)	8.055 (2.85)	.008 (1.50)	−.005 (−.43)
Ex 1^2		.289 (4.33)				−.165 (−2.39)		
Ex 2	2.77 (1.96)	6.89 (1.14)	.0027 (.86)	.0217 (2.44)	−.818 (−.63)	−3.41 (−1.17)	−.0033 (−.59)	−.009 (−.71)
Ex 2^2		−.181 (−2.65)				.078 (1.25)		
Ed	27.41 (11.54)	−64.72 (−2.93)	.061 (11.75)	.1126 (4.09)	4.09 (2.15)		.015 (1.83)	−.027 (−.576)
Ed^2		3.37 (6.41)						
Ed Ex 1		1.124 (2.73)		−.0011 (−1.35)				.0017 (1.26)
Ed Ex 2		.151 (.34)		−.0019 (−2.36)				.0007 (.43)
CONST.	−60.04 (−.93)	543.5 (2.83)	4.98 (35.20)	4.45 (13.79)	219.8 (4.05)	190.7 (3.17)	5.36 (22.94)	5.71 (12.60)
$\bar{R}^2$	.264	.371	.297	.304	.140	.160	.122	.124
$\bar{Y}$	mean HRY = 358				mean HRY = 269			

Table A-24

Small-Scale Industry Earnings Equations, The United States, The Parnes Data 1966, Males of Age, 45 to 59, Manufacturing Industries. Dependent Variable is Hourly Earnings in U.S. Cents

	WHITE: N = 284			NON-WHITE: N = 121		
	HRY		LNHRY	HRY		LNHRY
Ex 1	.702 (.41)	6.022 (1.17)	.0018 (.323)	2.60 (1.58)	7.36 (1.69)	.0098 (1.10)
Ex 1^2					−.018 (−.236)	
Ex 2	−.461 (−.27)	5.807 (1.15)	−.0034 (−.622)	.111 (.06)	15.57 (2.53)	−.003 (−.33)
Ex 2^2					−.198 (−2.29)	
Ed	18.87 (6.44)	39.81 (2.36)	.056 (6.04)	6.62 (3.14)	28.83 (1.38)	.033 (2.89)
Ed^2					−.263 (−.55)	
Ed Ex 1		−.549 (−1.09)			−.306 (−.63)	
Ed Ex 2		−.652 (−1.32)			−.645 (−1.31)	
CONST.	125.8 (1.59)	−81.18 (−.44)	5.16 (20.85)	115.3 (1.72)	−184.0 (−1.19)	4.91 (13.63)
$\bar{R}^2$	.189	.189	.188	.166	.230	.153
$\bar{Y}$	mean HRY = 304			mean HRY = 191		

Table A-25

Large-Scale Industry Earnings Equations, Japan 1967,
Males of Age 40 to 59, Manufacturing Industries.
Dependent Variable is Hourly Earnings in U.S. Cents. N = 132 Cells

	YB				Y			
	HRYB		LNHRYB		HRY		LNHRY	
Ex 1	5.30 (10.67)	−10.76 (−5.47)	.049 (15.37)	.092 (2.53)	3.33 (10.43)	−5.72 (−4.08)	.039 (12.70)	.111 (3.16)
Ex 1²				−.0032 (−3.43)				−.0037 (−4.04)
Ex 2	−.26 (−.97)	−2.98 (−2.93)	−.0045 (−2.62)	.047 (2.82)	−.17 (−.99)	−2.20 (−3.03)	−.0035 (−2.12)	.047 (2.91)
Ex 2²				−.001 (−3.30)				−.001 (−3.64)
Ed	13.64 (19.84)	−66.24 (−8.98)	.099 (22.55)	.039 (1.33)	8.30 (18.80)	−39.49 (−7.51)	.080 (18.85)	.040 (1.40)
Ed²		2.21 (9.06)				1.34 (7.70)		
Ed Ex 1		1.58 (8.26)		.0058 (3.64)		.893 (6.53)		.0043 (2.82)
Ed Ex 2		.28 (2.77)		.0017 (−1.93)		.204 (2.88)		.0014 (−1.61)
CONST.	−110.5 (−7.92)	462.8 (8.61)	2.93 (32.86)	2.46 (5.80)	−49.23 (−5.50)	292.0 (2.88)	3.04 (35.36)	2.25 (5.47)
$\bar{R}^2$	.918	.963	.945	.959	.911	.950	.923	.942
$\bar{Y}$	mean HRYB = 105.0				mean HRY = 83.2			

Table A-26

Small-Scale Industry Earnings Equations, Japan 1967,
Males of Age 40 to 59, Manufacturing Industries.
Dependent Variable is Hourly Earnings in U.S. Cents. N = 108 Cells

	YB			Y		
	HRYB		LNHRYB	HRY		LNHRY
Ex 1	4.32 (8.78)	−.74 (−.31)	.053 (8.79)	2.56 (7.42)	.30 (.17)	.039 (7.26)
Ex 1²						
Ex 2	−.34 (−1.81)	−1.92 (−1.87)	−.0055 (−2.35)	−.26 (−1.95)	−1.30 (−1.73)	−.0048 (−2.33)
Ex 2²						
Ed	9.51 (15.23)	−30.89 (−3.74)	.096 (12.52)	6.36 (14.50)	−19.02 (−3.16)	.082 (12.03)
Ed²		1.39 (4.71)			.92 (4.24)	
Ed Ex 1		.48 (2.07)			.21 (1.26)	
Ed Ex 2		.16 (1.56)			.11 (1.40)	
CONST.	−58.93 (−5.46)	203.0 (3.52)	2.87 (21.67)	23.67 (3.12)	136.4 (3.24)	2.97 (25.28)
$\bar{R}^2$	.911	.931	.894	.899	.916	.878
$\bar{Y}$	mean HRYB = 73.2			mean HRY = 60.6		

Table A-27

Large-Scale Industry Earnings Equations, Japan 1967,
Males of Total Age Range, Manufacturing Industries.
Dependent Variable is Hourly Earnings in U.S. Cents. N = 66 Cells

	YB			Y		
	HRYB		LNHRYB	HRY		LNHRY
Ex 1	5.34 (13.42)	−5.52 (−3.27)	.068 (16.54)	3.52 (12.05)	−2.11 (−1.43)	.055 (13.00)
Ex 2	1.68 (3.74)	10.12 (3.94)	.018 (3.98)	1.55 (4.69)	6.35 (2.83)	.023 (4.82)
Ex 2^2		−.142 (−1.65)			−.103 (−1.37)	
Ed	8.08 (14.14)	.095 (16.09)	.095 (16.09)	5.52 (13.15)	2.86 (2.48)	.083 (13.58)
Ed Ex 1		1.05 (6.60)			.55 (3.93)	
Ed Ex 2		−.63 (−3.63)			−.32 (−2.11)	
CONST.	−71.88 (−8.75)	−24.06 (−1.32)	2.53 (29.87)	−41.68 (−6.90)	−19.35 (−1.22)	2.52 (28.65)
$\bar{R}^2$	.945	.971	.960	.935	.951	.941
$\bar{Y}$	mean HRYB = 72.7			mean HRY = 59.1		

Table A-28

Small-Scale Industry Earnings Equations, Japan 1967,
Males of Total Age Range, Manufacturing Industries.
Dependent Variable is Hourly Earnings in U.S. Cents. N = 54 Cells

	YB			Y		
	HRYB		LNHRYB	HRY		LNHRY
Ex 1	4.41 (7.71)	−2.56 (−1.01)	.067 (7.49)	2.81 (6.28)	−1.28 (−.68)	.052 (6.35)
Ex 2	.35 (.88)	8.90 (3.32)	.001 (.19)	.43 (1.50)	6.53 (3.28)	.005 (1.00)
Ex 2^2		−.24 (−3.46)			−.18 (−3.57)	
Ed	5.51 (7.83)	5.37 (2.67)	.074 (7.17)	3.87 (7.54)	4.22 (2.83)	.064 (6.90)
Ed Ex 1		.61 (2.69)			.35 (2.10)	
Ed Ex 2		−.27 (−1.75)			−.16 (−1.42)	
CONST.	−31.67 (−3.29)	−57.60 (−2.04)	2.83 (20.14)	−13.99 (−1.99)	−38.97 (−1.86)	2.82 (22.11)
$\bar{R}^2$	.891	.929	.889	.872	.913	.864
$\bar{Y}$	mean HRYB = 58.7			mean HRY = 49.4		

Table A-29

Earnings Equations by Size of Establishment, Japan,
Large Establishment (1000 Employees and More)
Males of All Age Range Manufacturing Industries, N = 48 Cells
Dependent Variable is Hourly Earnings in U.S. Cents

	YB					HRY				
	HRYB			LNHRYB		HRY			LNHRY	
Ex	2.93 (12.59)			.036 (16.32)		2.13 (14.76)			.034 (17.16)	
Ex 1		5.35 (11.26)	−7.42 (−3.74)		.061 (14.43)		3.77 (13.75)	−3.60 (2.88)		.055 (14.79)
Ex 1^2			.052 (1.63)					.019 (.97)		
Ex 2		−.64 (−.96)	5.78 (1.99)		.0008 (.13)		−.29 (−.75)	4.89 (2.67)		.001 (.21)
Ex 2^2			−.053 (−1.89)					−.054 (−2.56)		
Ed	8.08 (7.22)	6.22 (6.66)	−16.20 (−2.67)	.091 (8.52)	.072 (8.59)	5.04 (7.27)	3.78 (7.02)	−7.71 (−2.02)	.075 (8.01)	.058 (7.92)
Ed^2			.65 (2.73)					.34 (2.22)		
Ed Ex 1			1.00 (7.33)					.58 (6.79)		
Ed Ex 2			−.37 (−1.75)					−.30 (−2.29)		
CONST.	−52.53 (−3.74)	−37.78 (−3.36)	129.1 (3.44)	2.76 (20.60)	2.91 (20.00)	−24.14 (−2.77)	−14.14 (−2.18)	70.06 (2.96)	2.75 (23.26)	2.88 (32.42)
$\bar{R}^2$	.883	.931	.979	.924	.960	.908	.953	.983	.929	.963

Table A-30

Earnings Equations by Size of Establishment, Japan,
Medium Size Establishment (100 to 999 Employees),
Males of All Age Range, Manufacturing Industries. N = 48 Cells
Dependent Variable is Hourly Earnings in U.S. Cents

	HRYB					HRY				
	HRYB			LNHRYB		HRY			LNHRY	
Ex	1.43 (7.56)			.024 (8.26)		1.10 (8.12)			.022 (8.69)	
Ex 1		6.98 (13.88)	.40 (.19)		.116 (20.31)		5.05 (14.56)	.46 (.29)		.102 (19.60)
Ex 1^2			.048 (.88)					.009 (.21)		
Ex 2		−.52 (−2.61)	−1.91 (−1.58)		−.008 (−3.63)		−.31 (−2.21)	−.57 (−.63)		−.006 (−2.85)
Ex 2^2			−.015 (−1.00)					−.025 (−2.29)		
Ed	6.30 (5.96)	4.83 (8.69)	−13.33 (−4.25)	.089 (5.44)	.064 (10.19)	4.38 (5.81)	3.33 (8.62)	−8.06 (−3.45)	.078 (5.39)	.056 (9.69)
Ed^2			.60 (4.53)					.38 (3.87)		
Ed Ex 1			.449 (2.97)					.295 (2.61)		
Ed Ex 2			.220 (3.25)					.146 (2.89)		
CONST.	−26.49 (−2.11)	−31.71 (−4.94)	95.76 (5.15)	2.75 (14.18)	2.66 (36.40)	−12.07 (−1.35)	−15.82 (−3.54)	63.79 (2.89)	2.71 (15.88)	2.64 (39.26)
$\bar{R}^2$	.781	.948	.986	.793	.973	.794	.953	.985	.804	.972

Table A-31

Earnings Equations by Size of Establishment, Japan,
Small Size Establishment (10 to 99 Employees)
Males of All Age Range, Manufacturing Industries. N = 48 Cells
Dependent Variable is Hourly Earnings in U.S. Cents

	HRYB					HRY				
	HRYB			LNHRYB		HRY			LNHRY	
Ex	.58 (4.67)			.012 (4.92)		.49 (4.84)			.011 (5.06)	
Ex 1		7.56 (21.57)	4.17 (3.05)		.149 (23.73)		6.18 (21.63)	3.77 (3.42)		.138 (23.34)
Ex 1^2			.005 (.10)					−.017 (−.39)		
Ex 2		−.78 (−9.97)	−1.38 (−3.29)		−.015 (−10.56)		−.62 (−9.70)	−.938 (−2.76)		−.013 (−10.12)
Ex 2^2			−.0053 (−1.23)					−.008 (−2.35)		
Ed	4.70 (4.94)	3.86 (12.64)	−7.67 (−3.89)	.076 (4.08)	.059 (10.80)	3.68 (4.74)	2.99 (11.99)	−6.40 (−4.02)	.068 (3.97)	.053 (10.25)
Ed^2			.401 (4.76)					.338 (4.96)		
Ed Ex 1			.270 (2.49)					.182 (2.08)		
Ed Ex 2			.094 (3.34)					.079 (3.45)		
CONST.	−2.79 (−.27)	−19.33 (−5.75)	56.11 (4.79)	2.99 (14.95)	2.67 (44.19)	2.51 (.30)	−11.01 (−4.01)	49.20 (5.20)	2.95 (15.93)	2.65 (46.63)
$\bar{R}^2$	.667	.972	.990	.643	.975	.665	.971	.990	.646	.974

Table A-32

Inter-Industry Analysis, The United States, Non-White Males of Total Age Range, The S.E.O. Data 1966, Manufacturing Industries. Dependent Variable is Natural Logarithmic of Hourly Earnings. N = 1117

	Dependent Variable is LNHRY: N = 1117							
Ex	.013 (11.47)	.012 (10.94)	.0093 (8.63)	.0096 (8.74)	.0091 (8.52)	.0089 (8.36)	.0083 (7.94)	.0083 (7.77)
Ed	.064 (14.42)	.065 (14.57)	.055 (13.18)	.053 (12.47)	.052 (12.44)	.051 (12.25)	.050 (12.31)	.050 (12.16)
K		.0033 (3.89)	−.0005 (−.57)	.0017 (2.14)	.0004 (.48)	.0004 (.56)	−.0008 (−1.05)	−.0005 (−.68)
U			.0092 (14.02)				.0054 (6.81)	.0070 (9.83)
C				.0007 (11.97)		.0017 (1.68)		.0049 (6.89)
S					.0061 (14.69)	.0053 (8.20)	.0040 (7.96)	
CONST.	4.55 (74.34)	4.51 (73.23)	4.11 (64.49)	4.42 (75.63)	4.45 (80.41)	4.52 (77.95)	4.29 (64.89)	4.15 (66.18)
$\bar{R}^2$	.166	.176	.299	.270	.310	.311	.337	.328

Table A-33

Inter-Industry Analysis, Japan 1967, Manufacturing Industries, Males of Total Age Range, Dependent Variable is Natural Logarithm of Hourly Earnings

	Dependent Variable is LNHRY: N = 120 CELLS							
Ex	.032 (10.77)	.029 (11.52)	.031 (14.44)	.032 (15.24)	.031 (16.04)	.032 (16.51)	.031 (16.31)	.032 (15.35)
Ed	.095 (13.50)	.088 (14.75)	.098 (18.02)	.091 (18.74)	.091 (19.95)	.091 (20.40)	.091 (20.17)	.090 (18.92)
K		.033 (7.48)	.014 (2.92)	.017 (3.87)	.020 (5.32)	.017 (4.22)	.016 (3.67)	.013 (2.92)
U			.003 (6.98)				.001 (2.00)	.001 (2.10)
C				.005 (7.55)		.002 (2.32)		.003 (3.20)
S					.004 (8.92)	.003 (4.59)	.003 (5.10)	
CONST.	2.46 (21.68)	2.51 (26.70)	2.40 (29.77)	2.30 (27.92)	2.39 (32.36)	2.33 (30.57)	2.38 (32.46)	2.32 (28.36)
$\bar{R}^2$	.781	.857	.901	.906	.917	.921	.920	.909

Table A-34

Inter-Industry Analysis, The United States Manufacturing Industries. White Males of Age 45 to 59 The Parnes Data, Dependent Variable is Natural Logarithm of Hourly Earnings

	Dependent Variable is LNHRY: N = 911							
Ex 1	.0067 (2.06)	.0056 (2.02)	.0053 (1.93)	.0056 (2.03)	.0058 (2.12)	.0059 (2.14)	.0055 (2.03)	.0053 (1.94)
Ex 2	−.0016 (−.56)	−.0015 (−.52)	−.0012 (−.41)	−.0010 (−.36)	−.0006 (−.22)	−.0006 (−.23)	−.0007 (−.26)	−.0010 (−.36)
Ed	.067 (14.27)	.067 (14.33)	.067 (14.56)	.067 (14.38)	.066 (14.39)	.066 (14.36)	.067 (14.50)	.067 (14.55)
K		.000 (1.41)	−.000 (−.15)	.000 (1.15)	.000 (.65)	.000 (.58)	−.000 (−.05)	−.000 (−.08)
U			.004 (4.85)				.002 (2.43)	.003 (3.85)
C				.0002 (3.12)		−.0001 (−1.15)		.0001 (1.10)
S					.0002 (4.99)		.0001 (2.70)	
CONST.	5.05 (39.12)	5.03 (38.78)	4.79 (34.97)	4.95 (37.54)	4.94 (38.31)	4.97 (38.00)	4.83 (35.18)	4.78 (34.91)
$\bar{R}^2$	.299	.300	.317	.306	.318	.318	.321	.317

Table A-35

Inter-Industry Analysis, The United States, The Parnes Data 1966, Non-White Males of Age 45 to 59, Manufacturing Industries. Dependent Variable is Natural Logarithm of Hourly Earnings.

	Dependent Variable is LNHR: N = 308							
Ex 1	.0122 (2.50)	.0120 (2.46)	.0033 (.76)	.0061 (1.32)	.0069 (1.56)	.0062 (1.40)	.0033 (.78)	.0022 (.51)
Ex 2	−.0034 (−.68)	−.0033 (−.65)	−.0048 (−1.11)	−.0044 (−.96)	−.0024 (−.53)	−.0028 (−.63)	−.0040 (−.94)	−.0051 (−1.18)
Ed	.029 (4.29)	.030 (4.34)	.021 (3.44)	.019 (2.94)	.021 (3.28)	.019 (3.06)	.019 (3.19)	.018 (2.93)
K		.000 (.66)	−.000 (−3.24)	.000 (.23)	−.000 (−.82)	−.000 (−.68)	−.000 (−2.87)	−.000 (−2.77)
U			.0111 (10.00)				.008 (5.51)	.009 (7.19)
C				.0007 (7.08)		.0002 (1.22)		.0003 (2.83)
S					.0006 (8.53)	.0005 (4.58)	.0002 (2.81)	
CONST.	5.07 (24.75)	5.06 (24.46)	4.56 (24.54)	4.99 (25.98)	4.99 (26.87)	4.99 (26.83)	4.67 (24.90)	4.62 (24.98)
$\bar{R}^2$	.215	.214	.407	.323	.364	.365	.420	.421

Table A-36

Inter-Industry Analysis, Japan, Manufacturing Industries, Males of Age 4o to 59. Dependent Variable is Natural Logarithm of Hourly Earnings

	Dependent Variable is LNHRYB: N = 240 CELLS							
Ex 1	.056 (23.45)	.054 (20.94)	.051 (17.25)	.048 (16.07)	.049 (15.48)	.046 (14.44)	.048 (14.90)	.048 (15.81)
Ex 2	−.006 (−4.18)	−.006 (−4.06)	−.005 (−3.72)	−.005 (−3.55)	−.005 (−3.69)	−.005 (−3.46)	−.005 (−3.57)	−.005 (−3.55)
Ed	.097 (24.62)	.098 (24.81)	.099 (25.14)	.099 (25.85)	.099 (25.22)	.100 (25.76)	.099 (25.28)	.099 (25.75)
K		.006 (1.83)	.003 (.70)	.002 (.62)	.005 (1.57)	.002 (.67)	.003 (.89)	.002 (.65)
U			.001 (2.29)				−.0006 (1.27)	−.0001 (−.17)
C				.003 (3.96)		.002 (3.07)		.003 (3.19)
S					.001 (2.61)	.0005 (.91)	.001 (1.77)	
CONST.	2.85 (38.12)	2.85 (38.12)	2.85 (38.63)	2.82 (38.80)	2.87 (38.87)	2.83 (38.53)	2.86 (38.81)	2.82 (38.59)
$\bar{R}^2$	.948	.949	.950	.952	.950	.950	.950	.952

Table A-37

Inter-Industry Analysis, Japan 1967, Males of Age 40 to 59, Manufacturing Industries Dependent Variable is Natural Logarithm of Hourly Earnings.

	Dependent Variable is LNHRY: N = 240 CELLS							
Ex 1	.049 (21.14)	.046 (18.71)	.042 (15.44)	.040 (14.48)	.039 (13.50)	.037 (12.63)	.038 (13.04)	.040 (14.19)
Ex 2	−.005 (−3.50)	−.004 (−3.35)	−.004 (−2.94)	−.003 (−2.74)	−.004 (−2.78)	−.003 (−2.54)	−.003 (−2.67)	−.003 (−2.71)
Ed	.080 (21.47)	.081 (21.94)	.082 (22.41)	.082 (23.05)	.083 (23.10)	.083 (23.47)	.083 (23.12)	.082 (22.99)
K		.009 (2.81)	.005 (1.43)	.005 (1.52)	.008 (2.47)	.005 (1.66)	.006 (1.82)	.005 (1.38)
U			.001 (2.77)				.0004 (1.01)	.0001 (.20)
C				.003 (4.26)		.002 (2.58)		
S					.002 (4.25)	.001 (2.57)	.002 (3.33)	.003 (3.18)
CONST.	2.89 (40.32)	2.90 (40.91)	2.89 (41.42)	2.86 (41.47)	2.91 (42.56)	2.88 (41.91)	2.91 (42.43)	2.86 (41.27)
$\bar{R}^2$	.934	.936	.938	.941	.941	.942	.941	.941

Table A-38

Inter-Industry Analysis, Japan 1967, Males of Age Range, Manufacturing Industries. Dependent Variable is Natural Logarithm of Hourly Earnings.

	Dependent Variable is LNHRY: N = 120 CELLS							
Ex 1	.079 (24.53)	.073 (20.77)	.069 (17.33)	.067 (16.93)	.066 (16.68)	.064 (15.80)	.065 (15.97)	.066 (16.41)
Ex 2	−.0001 (−.05)	.0024 (.85)	.0077 (2.33)	.0097 (2.73)	.0096 (2.82)	.0118 (3.26)	.0108 (3.08)	.010 (2.87)
Ed	.076 (15.27)	.078 (16.20)	.083 (16.67)	.085 (16.63)	.085 (16.89)	.087 (16.93)	.086 (16.97)	.085 (16.68)
K		.0127 (3.45)	.0078 (1.97)	.0093 (2.50)	.0115 (3.22)	.0098 (2.66)	.0091 (2.31)	.0079 (1.99)
U			.0013 (2.88)				.0007 (1.35)	.0006 (1.10)
C				.0024 (3.28)		.0014 (1.68)		.0017 (1.79)
S					.0018 (3.49)	.0013 (2.11)	.0014 (2.33)	
CONST.	2.75 (36.64)	2.73 (37.87)	2.64 (34.32)	2.57 (30.14)	2.62 (34.22)	2.55 (30.23)	2.59 (33.23)	2.57 (30.17)
$\bar{R}^2$	.942	.947	.951	.951	.952	.953	.953	.952

Note: K is Capital/Labor ratio, U is unionization ratio, C is product market concentration ratio, and S is the ratio of employees employed in large establishments with 1000 employees to the total number employed in each industry.

Table A-39

Inter-Industry Analysis: Supplement, The United States,
The S.E.O. Data 1966, White-Males of Total Age Range, Manufacturing Industries,
Dependent Variable is Natural Logarithm of Hourly Earnings in U.S. Cents

	Dependent Variable is LNHRY: N = 3170										
K	.0024 (5.59)										
V		.0128 (11.62)				.0089 (7.92)	.0106 (9.49)	.0102 (9.26)	.0042 (4.37)	.0054 (5.60)	.0054 (5.71)
U			.0060 (14.23)			.0050 (11.34)			.0037 (9.96)		
C				.0045 (10.36)			.0035 (7.92)			.0027 (7.20)	
S					.0038 (13.46)			.0033 (11.45)			.0022 (8.91)
Ex									.0097 (18.21)	.0099 (18.47)	.0096 (18.12)
Ed									.078 (34.67)	.079 (35.00)	.077 (34.24)
CONST.	5.77 (575.2)	5.61 (299.1)	5.40 (182.5)	5.65 (327.0)	5.67 (457.4)	5.33 (174.2)	5.52 (251.8)	5.53 (283.7)	4.42 (116.8)	4.54 (131.8)	4.58 (137.4)
$\bar{R}^2$	.009	.041	.060	.032	.054	.078	.059	.078	.334	.324	.330

Note: V stands for value added per employee.

Table A-40

Inter-Industry Analysis: Supplement, Japan 1967,
Males of Total Age Range, Manufacturing Industries.
Dependent Variable is Natural Logarithm of Hourly Earnings in The U.S. Cents

	Dependent Variable is LNHRY: N = 120 CELLS										
K	.050 (5.58)										
V		.099 (6.78)				.073 (2.84)	.076 (4.07)	.079 (4.63)	.031 (2.41)	.041 (4.81)	.049 (6.30)
U			.0048 (6.12)			.0016 (1.24)			.0031 (4.60)		
C				.0077 (5.54)			.0034 (2.03)			.0054 (7.07)	
S					.0056 (5.15)			.0026 (2.23)			
Ex									.035 (14.64)	.036 (16.59)	.035 (16.65)
Ed									.108 (19.39)	.109 (21.55)	.109 (21.85)
CONST.	4.06 (137.76)	3.86 (76.35)	3.99 (110.4)	3.91 (74.37)	4.07 (137.7)	3.88 (73.72)	3.82 (70.15)	3.87 (77.51)	2.26 (25.28)	2.12 (25.27)	2.22 (27.58)
$\bar{R}^2$	.449	.524	.484	.447	.420	.527	.541	.546	.911	.927	.929

Table A-41

Zero-Order Correlation Matrices, The United States, The S.E.O. Data 1966, Males of Total Age Range, Manufacturing Industries

(i) WHITE: N = 3170

	Ed	Ex	V	K	U	C	S
Ex	−.413						
V	.156	.007					
K	.051	.050	.795				
U	.122	.014	.299	.272			
C	.094	−.006	.240	.063	.390		
S	.141	.009	.205	.096	.514	.799	
LNHRY	.472	.061	.202	.099	.245	.181	.233

(ii) NON-WHITE: N = 1117

	Ed	Ex	V	K	U	C	S
Ex	−.566						
V	.039	.133					
K	−.108	.168	.702				
U	.020	.188	.381	.340			
C	.096	.140	.380	.175	.493		
S	.078	.153	.321	.259	.648	.785	
LNHRY	.263	.110	.226	.117	.437	.408	.463

Table A-42

Zero-Order Correlation Matrices, The United States, The Parnes Data 1966, Males of Age 45 to 59, Manufacturing Industries

(i) WHITE: N = 911

	Ed	Ex	Ex1	Ex2	V	K	U	C	S
Ex	−.586								
Ex1	.039	.179							
Ex2	−.310	.291	−.889						
V	.073	−.082	.091	−.127					
K	−.036	.027	.133	−.117	.756				
U	−.003	.009	.157	−.149	.194	.327			
C	.049	−.044	.139	−.156	.246	.099	.460		
S	.075	−.069	.131	−.159	.217	.165	.594	.782	
LNHRY	.516	−.277	.206	−.329	.153	.046	.165	.140	.203

(ii) NON-WHITE: N = 308

	Ed	Ex	Ex1	Ex2	V	K	U	C	S
Ex	−.527								
Ex1	.027	.213							
Ex2	−.290	.291	−.873						
V	.009	.037	.231	−.208					
K	−.095	.064	.199	−.163	.783				
U	.106	.050	.414	−.381	.503	.419			
C	.236	−.023	.344	−.348	.376	.104	.577		
S	.194	−.042	.370	−.384	.302	.216	.735	.800	
LNHRY	.292	−.098	.377	−.418	.209	.080	.560	.497	.546

Table A-43

Zero-Order Correlation Matrices, Japan, 1967, Males, Manufacturing Industries

(i) MALES OF TOTAL AGE RANGE: N = 120 CELLS

	Ed	Ex	Ex1	Ex2	V	K	U	C	S
Ex	−.667								
Ex1	−.214	.691							
Ex2	−.750	.900	.308						
V	.105	.007	.462	−.269					
K	.552	.010	.416	−.125	.838				
U	.085	−.051	.438	−.331	.823	.595			
C	.094	−.121	.390	−.394	.628	.497	.840		
S	.054	−.083	.395	−.347	.534	.383	.748	.776	
LNHRYB	.541	.072	.640	−.290	.529	.457	.491	.454	.428
LNHRY	.485	.136	.660	−.219	.524	.484	.479	.427	.426

(ii) MALES OF AGE 40 TO 59: N = 240 CELLS

	Ed	Ex	Ex1	Ex2	V	K	U	C	S
Ex	−.451								
Ex1	.116	−.023							
Ex2	−.438	.845	−.553						
V	.607	−.079	.653	−.415					
K	.012	−.045	.490	−.299	.841				
U	.042	−.099	.704	−.459	.840	610			
C	.048	−.010	.725	−.471	.660	.538	.841		
S	.016	−.075	.741	−.459	.561	.431	.742	.764	
LNHRYB	.692	−.370	.719	−.692	.495	.363	.536	.568	.536
LNHRY	.667	−.377	.712	−.684	.499	.378	.539	.569	.555

APPENDIX B

PREDICTED EARNINGS DATA FROM THE SELECTED REGRESSION RESULTS

Note: The predicted earnings presented in Tables B-1 through B-5 provide the data for the earnings profiles drawn in Diagrams I to XV.

Table B-1

The Predicted Hourly Earnings in U.S. Cents for Selected Ages
All Industries, Males of Total Age Range

(i) THE UNITED STATES

	WHITE			NON-WHITE		
Education	8 yrs.	12	16	8	12	16
Age 14	159	0	0	150	0	0
18	204	230	0	174	196	0
22	243	273	396	196	220	311
25	269	301	431	210	237	332
30	304	341	483	230	262	364
35	329	372	526	246	282	392
40	345	393	559	257	297	415
45	352	404	582	264	308	434
50	349	406	596	266	314	449
55	336	399	600	264	316	458
60	314	382	595	257	314	464
65	282	355	581	245	306	464

Note: For the diagram of these profiles, see Diagram III.

(ii) JAPAN

	HRYB			HRY		
Education	9 yrs.	12	16	9	12	16
Age 15	14.0	0	0	16.0	0	0
18	27.0	25.0	0	25.7	22.0	0
22	42.3	44.4	39.0	37.1	36.2	33.0
25	52.1	57.3	60.7	44.4	45.7	47.9
30	65.4	75.9	93.7	54.4	59.3	70.5
35	75.0	90.6	123.0	61.6	70.1	90.2
40	80.7	101.5	148.5	66.0	78.1	107.2
45	82.7	108.6	170.1	67.6	83.2	121.4
50	80.9	112.0	188.0	66.4	85.6	132.7
55	75.2	111.5	202.1	62.4	85.2	141.3
60	65.8	107.2	212.4	55.6	82.0	147.1
65	52.5	99.2	218.8	46.0	76.0	150.0

Note: For the diagram of these profiles, see Diagram IV.

Table B-2

The Predicted Earnings in U.S. Cents for Selected Ages,
All Males of Total Age Range,
The Earnings were Predicted on The Basis of Regression Results of Table IV

(i) THE UNITED STATES

	WHITE			NON-WHITE		
Education	8 yrs.	12	16	8	12	16
Age 14	159.0	0	0	150.0	0	0
18	204.4	230.0	0	174.4	196.0	0
22	243.8	273.4	396.0	196.0	220.9	311.0
25	269.3	301.9	431.7	210.3	237.7	332.5
30	304.3	341.8	483.7	230.5	262.1	364.8
35	329.7	372.3	526.1	246.5	282.0	392.6
40	345.7	393.2	559.1	257.4	297.4	415.9
45	352.1	404.7	582.5	264.1	308.3	434.7
50	349.1	406.6	596.5	266.3	314.7	449.0
55	336.5	399.1	600.9	264.0	316.6	458.8
60	314.5	382.0	595.9	257.2	314.0	464.1
65	282.9	355.5	581.3	245.9	306.9	464.9

Note: For the diagram of these profiles, see Diagram V.

(ii) JAPAN

	HRYB			HRY		
Education	9 yrs.	12	16	9	12	16
Age 15	14.0	0	0	16.0	0	0
18	27.0	25.0	0	25.7	22.0	0
22	42.3	44.4	39.0	37.1	36.2	33.0
25	52.1	57.3	60.7	44.4	45.7	47.9
30	65.4	75.9	93.7	54.4	59.3	70.5
35	75.0	90.6	123.0	61.6	70.1	90.2
40	80.7	101.5	148.5	66.0	78.1	107.2
45	82.7	108.6	170.1	67.6	83.2	121.4
50	80.9	112.0	188.0	66.4	85.6	132.7
55	75.2	111.5	202.1	62.4	85.2	141.3
60	65.8	107.2	212.4	55.6	82.0	147.1
65	52.5	99.2	218.8	46.0	76.0	150.0

Note: For the diagram of these profiles, see Diagram VI.

Table B-3(a)
The Predicted Earnings for Selected Ages: Simulation Results, All Industries
Hypothetical Case (I): A Worker has Internal Experience Only
Hypothetical Case (II): A Worker has External Experience Only
Hypothetical Case (III): A Worker has half and half of Internal and External Expreiences

(i) THE UNITED STATES

	WHITE MALES OF AGE 45 TO 59								
Education	8 Years			12 Years			16 Years		
Case	I	II	III	I	II	III	I	II	III
Age 45	182.0	182.0	182.0	317.0	317.0	317.0	505.0	505.0	505.0
47	183.4	191.1	187.2	318.0	321.1	219.5	505.6	504.1	504.8
50	186.6	203.8	192.4	319.6	326.4	322.1	507.6	501.9	504.7
53	191.3	215.4	203.0	324.7	330.5	327.3	511.1	498.7	504.6
56	197.4	225.9	208.4	330.2	333.6	329.9	516.0	494.3	504.6
59	205.0	235.3	219.2	337.2	335.6	335.4	522.4	488.9	504.7
	NON-WHITE MALES OF AGE 45 TO 59								
45	201.0	201.0	201.0	248.0	248.0	248.0	283.0	283.0	283.0
47	202.5	208.4	205.5	249.1	252.7	250.9	283.7	284.9	284.4
50	205.4	217.9	209.9	251.4	258.1	253.8	288.4	286.3	285.7
53	208.9	225.4	218.3	254.3	261.5	259.0	287.7	285.6	287.8
56	213.2	230.9	222.3	258.0	262.9	261.5	290.8	283.0	288.7
59	218.2	234.5	229.8	262.4	262.4	265.9	294.6	278.4	289.9

Note: For the diagram of these profiles, see Diagram VII.

(ii) JAPAN: MALES AGE 40 TO 59, HRY

Education	9 Years			12 Years			16 Years		
Case	I	II	III	I	II	III	I	II	III
Age 40	52.0	52.0	52.0	43.0	43.0	43.0	60.0	60.0	60.0
42	54.7	52.7	53.7	47.5	44.7	46.1	66.9	63.0	65.0
45	58.6	53.4	55.3	54.1	46.9	49.1	77.1	67.3	69.9
48	62.5	53.8	58.5	60.7	48.9	55.1	87.3	71.3	79.6
51	66.4	53.9	59.9	67.3	50.5	58.0	97.5	75.0	84.4
54	70.2	53.7	62.9	73.8	51.9	63.8	107.6	78.4	93.9
57	74.0	53.2	64.3	80.3	52.9	66.6	117.7	81.4	98.6
59	76.5	52.7	65.7	84.6	53.4	69.4	124.4	83.3	103.3

Note: For the diagram of these profiles, see Diagram VIII.

Table B-3(b)
The Predicted Earnings for Selected Ages: Simulation Results, All Industries,
Hypothetical Case (I): A Worker has Internal Experience Only
Hypothetical Case (II): A Worker has External Experience Only
Hypothetical Case (III): A Worker has half and half of Internal and External Experiences

(iii) JAPAN: MALES OF TOTAL AGE RANGE, HRYB

Earnings	Total Hourly Earnings Including Bonuses (HRYB) in U.S. Cents								
Education	9 Years			12 Years			16 Years		
Case	I	II	III	I	II	III	I	II	III
Age 15	29.0	29.0	29.0	0	0	0	0	0	0
18	29.9	31.9	33.7	21.0	21.0	21.0	0	0	0
22	53.9	34.8	42.8	45.5	24.4	35.2	36.0	36.0	36.0
25	64.1	36.3	51.4	63.6	26.3	42.1	64.5	38.4	46.4
30	80.4	37.6	39.7	93.0	28.2	62.4	111.4	41.2	77.1
35	95.8	37.2	71.4	121.5	28.5	75.4	157.4	42.3	97.0
40	110.4	35.3	78.7	149.2	27.2	94.1	202.6	41.9	126.2
45	124.1	31.7	88.9	176.0	24.3	100.2	246.9	39.9	145.2
50	137.0	26.6	95.3	202.0	19.8	123.5	290.4	36.2	172.9
55	149.0	21.3	104.0	227.1	13.7	134.5	333.0	31.0	190.9
60	160.2	11.5	109.4	251.4	6.0	150.3	374.7	24.1	217.1
65	170.5	1.6	116.6	274.8	−3.3	160.4	415.6	15.7	234.1
Earnings	Contracted Earnings without Including Bonuses (HRY) in U.S. Cents								
Age 15	26.0	26.0	26.0	0	0	0	0	0	0
18	33.8	29.5	29.9	21.0	21.0	21.0	0	0	0
22	43.6	33.2	37.3	37.3	25.6	31.6	33.0	33.0	33.0
25	50.6	35.3	44.2	49.1	28.3	36.8	51.3	36.6	40.4
30	61.5	37.4	50.8	68.1	31.5	51.7	81.1	41.2	62.0
35	71.5	37.8	59.9	86.2	32.9	61.1	109.9	44.1	75.8
40	80.6	36 4	65.4	103.4	32.7	74.4	137.9	45.3	95.8
45	88.8	33.4	72.9	119.6	30.8	82.7	164.9	44.8	108.6
50	96.0	28.7	77.3	135.0	27.1	94.4	191.0	42.6	127.1
55	102.4	22.3	83.3	149.4	21.8	101.7	216.2	38.7	138.8
60	107.8	14.2	86.7	162.9	14.8	111.9	240.5	33.2	155.7
65	112.3	4.4	91.0	175.5	6.1	118.2	263.8	25.9	166.4

Note: These profiles are diagramed in Diagram IX.

Table B-4
The Predicted Hourly Earnings in U.S. Cents for Selected Ages, Blue-Collar VS. White-Collar Earnings, Males of Total Age Range, Manufacturing Industries

(i) THE UNITED STATES: WHITE MALES

Occupation	BLUE-COLLAR		WHITE-COLLAR		
Education	8 yrs.	12	8	12	16
Age 14	112.0	0	21.0	0	0
18	158.7	234.0	91.6	189.0	0
22	199.6	272.7	153.7	257.5	356.0
25	226.5	298.0	194.7	303.2	406.6
30	264.3	333.0	252.4	369.0	480.2
35	293.0	359.1	296.9	421.4	540.6
40	312.9	376.2	328.2	460.6	587.8
45	323.8	384.3	346.2	486.6	621.7
50	325.7	383.5	350.9	499.3	642.4
55	318.7	373.7	342.4	498.7	649.8
60	302.7	355.0	320.6	484.9	644.0
65	277.8	327.4	385.6	457.9	624.9

Note: These profiles are diagramed in Diagram X.

(ii) JAPAN: HRYB

Occupation	BLUE-COLLAR		WHITE-COLLAR		
Education	9 yrs.	12	9	12	16
Age 15	19.0	0	0	0	0
18	30.2	32.0	17.6	16.0	0
22	43.4	46.1	38.2	41.0	36.0
25	51.8	55.2	51.5	57.7	57.1
30	63.3	67.9	69.7	81.4	88.2
35	71.5	77.2	82.8	100.1	114.3
40	76.4	83.3	90.9	113.8	135.4
45	77.9	86.0	94.0	122.4	151.3
50	76.2	85.4	91.9	125.9	162.3
55	71.2	81.6	84.9	124.4	168.2
60	62.8	74.4	72.8	117.8	169.0
65	51.2	64.0	55.6	106.2	164.8

Note: These profiles are diagramed in Diagram XI.

Table B-5
The Predicted Hourly Earnings in U.S. Cents for Selected Ages, Large-Scale VS. Small-Scale Industries, Males of Total Age Range, Manufacturing Industries

(i) THE UNITED STATES

Education	WHITE						NON-WHITE					
	Large-Scale Industries			Small-Scale Industries			Large-Scale Industries			Small-Scale Industries		
	8 yrs.	12	16	8	12	16	8	12	16	8	12	16
Age 14	57.0	0	0	43.0	0	0	133.0	0	0	114.0	0	0
18	116.1	230.0	0	104.1	210.0	0	162.4	233.0	0	136.9	204.0	0
22	168.4	280.5	404.0	157.7	263.1	377.0	189.0	255.4	333.0	157.2	221.2	294.0
25	203.2	313.9	436.0	192.9	298.0	411.5	207.1	270.4	344.8	170.7	232.5	303.0
30	252.8	361.2	481.0	242.1	346.6	459.6	233.8	291.9	361.1	190.0	248.0	314.6
35	291.9	397.9	515.4	279.4	383.3	495.8	256.1	309.0	373.0	205.2	259.4	322.3
40	320.4	424.1	539.3	304.9	408.3	520.1	274.1	321.8	380.6	216.4	266.8	325.9
45	338.3	439.7	552.6	318.5	421.3	532.6	287.8	330.2	383.8	223.5	270.1	325.4
50	345.7	444.8	555.3	320.3	422.5	533.3	297.1	334.3	382.7	226.6	269.4	320.9
55	342.6	439.3	547.5	310.2	411.9	522.1	302.0	334.0	377.2	225.6	264.6	312.3
60	328.9	423.3	529.2	288.3	389.4	499.1	302.6	329.4	367.4	220.6	255.8	299.7
65	304.6	396.7	500.3	254.5	355.1	464.2	298.9	320.5	353.2	211.6	243.0	283.0

Note: These profiles are diagramed in Diagrams XII and XIII.

(ii) JAPAN

Education	HRYB						HRY					
	Large-Scale Industries			Small-Scale Industries			Large-Scale Industries			Small-Scale Industries		
	8 yrs.	12	16	8	12	16	8	12	16	8	12	16
Age 15	−6.0	0	0	−7.0	0	0	1.0	0	0	2.0	0	0
18	7.3	10.0	0	6.7	7.0	0	10.8	14.0	0	11.8	12.0	0
22	24.1	31.7	33.0	22.6	28.0	26.0	23.2	29.2	31.0	23.2	26.8	25.0
25	36.0	47.2	53.4	32.7	41.9	45.0	31.9	40.1	44.7	30.5	36.7	38.3
30	54.5	71.7	86.0	46.1	61.6	73.2	45.4	57.1	66.5	40.2	50.6	58.0
35	71.2	94.5	116.9	55.1	77.0	97.1	57.6	72.9	87.0	46.8	61.6	74.6
40	86.3	115.6	146.1	59.7	88.0	116.6	68.5	87.3	106.2	50.4	69.4	88.2
45	99.7	135.1	173.6	60.0	94.7	131.8	78.1	100.5	124.1	50.9	74.2	98.7
50	111.3	152.8	199.4	56.0	97.0	142.6	86.4	112.3	140.6	48.4	76.0	106.2
55	121.3	168.8	223.5	47.6	95.0	149.1	93.4	122.9	155.9	42.8	74.7	110.6
60	129.5	183.1	245.9	34.8	88.6	151.2	99.1	132.1	169.9	34.2	70.4	112.0
65	136.1	195.7	266.6	17.7	77.9	149.0	103.4	140.1	182.6	22.5	63.0	110.4

Note: These profiles are diagramed in Diagrams XIV and XV.

APPENDIX C

LIST OF LARGE-SCALE AND SMALL-SCALE INDUSTRIES IN THE UNITED STATES AND JAPAN

Note: For definitions and explanations of industry characteristics, see footnotes to Appendix Tables C's, pages 233 and 234.

Table C-1(i)
The United States, Large-Scale Industries and Their Characteristics

PC	NAME OF INDUSTRY	S1	S2	V/L	K/L	U	C(L)	C(S)
237	Blast Furnace, Steel Works etc.	89.5	98.0	16.7	40.7	99	48.4	48.5
268	Aircraft and Parts	85.0	93.5	14.1	5.8	82	58.6	61.1
267	Motor Vehicles and Equipments	76.3	90.0	18.5	13.2	87	72.8	77.1
257	Office, Computing and Accounting Machines	72.1	90.6	17.5	7.4	52	67.1	66.5
287	Photographic Equipment and Supplies	71.0	85.6	26.1	13.9	43	67.0	67.0
238	Other Primary Iron and Steel	64.8	85.2	15.0	5.4	84	26.3	26.2
406	Synthetic Fibers	64.5	86.0	22.0	40.2	64	80.9	81.1
269	Ship and Boat Building and Repair	60.2	78.6	10.1	5.0	70	37.9	37.7
259	Electrical Machinery, Equipment and Supplies	53.9	80.9	13.0	6.5	73	42.5	44.4
426	Rubber Products	51.4	79.5	14.5	12.4	81	43.0	48.9
407	Drugs and Medicines	49.7	77.8	34.6	16.4	33	26.6	26.6
256	Farm Machinery	48.3	67.6	15.0	8.2	77	45.0	45.0
289	Watches, Clocks etc.	44.9	81.5	11.2	3.8	90	44.6	44.0
329	Tobacco Manufactures	43.4	73.0	27.1	11.3	64	70.2	74.0
416	Petroleum Refining	40.0	77.1	43.4	107.6	91	32.0	32.0
276	Railroad and Misc. Transportation Equipments	37.6	57.9	12.0	6.2	50	43.4	46.8
386	Pulp, Paper and Paper Board Mills	37.3	80.4	18.7	48.6	91	27.1	27.0
286	Professional Equipments and Supplies	35.0	66.3	13.4	5.8	53	33.3	33.0
216	Glass and Glass Products	34.4	81.9	14.3	15.2	95	64.6	64.5
246	Cuttery, Hand Tools and Hardware	30.8	62.9	14.9	9.1	60	33.4	34.1
258	Misc. Machinery	29.9	58.2	14.6	8.6	66	26.0	27.7
409	Misc. Chemicals and Allied Products	29.7	60.3	29.8	39.4	58	36.0	35.2
239	Primary, Non-Ferrous Metals	28.8	64.4	16.8	21.1	79	44.5	49.3
349	Yarn, Thread and Fabric	26.9	77.4	8.3	18.9	21	34.9	36.5
219	Pottery and Related Products	22.8	60.8	9.8	8.1	60	47.2	47.8
236	Misc. Non-Metalic Minerals	22.7	52.4	14.6	16.3	85	40.0	43.0
396	Newspaper Publishing and Printing	21.4	43.5	12.2	8.5	90	14.5	13.4

Table C-1(ii)
The United States, Small-Scale Industries and Their Characteristics

PC	NAME OF INDUSTRY	S1	S2	V/L	K/L	U	C(L)	C(S)
306	Meat Products	20.0	53.6	11.5	7.5	77	21.6	23.7
317	Confectionary and Related Products	19.2	57.6	16.7	17.1	62	34.1	40.1
248	Misc. Fabricated Metal Products	18.3	48.2	13.5	10.4	73	21.9	30.9
398	Printing, Publishing and Allied Industries	17.8	38.4	14.6	8.2	56	18.1	18.9
346	Knitting Mills	16.7	53.9	8.0	5.5	32	21.2	19.5
348	Floor Covering Except Hard Surfaces	16.7	45.2	13.7	9.0	62	36.1	33.0
309	Grain Mill Products	15.8	34.7	25.8	23.3	73	40.4	37.0
318	Beverages	14.3	40.8	22.5	19.1	70	27.3	35.3
356	Misc. Textiles	12.8	50.3	11.0	9.7	39	40.6	42.4
347	Dyeing and Finishing Except Wool and Knit Goods	12.3	62.6	9.6	10.7	42	38.1	38.2
389	Misc. Paper and Pulp Products	11.9	47.5	15.2	11.2	71	31.2	34.2
296	Misc. Manufacturing Industries	11.3	33.0	10.9	5.2	55	22.9	24.3
308	Canning and Preserving	10.9	44.5	13	8	10.5	69	28.5	30.3
209	Furniture and Fixture	10.1	43.6	9.8	4.7	43	15.4	16.2
367	Misc. Fabricated Textile Products	8.6	29.9	8.4	3.9	32	29.8	32.5
247	Fabricated Structural Metal Products	8.0	34.9	12.7	7.1	74	16.6	17.0
429	Misc. Plastic Products	7.5	34.7	9.8	9.9	54	8.0	8.0
438	Leather Products Except Footwear	6.5	30.3	7.9	2.3	48	24.5	25.4
316	Bakery Products	5.9	49.8	8.5	5.0	50	30.0	31.5
387	Paper Board Containers and Boxes	5.6	31.8	11.6	11.3	62	24.6	25.3
436	Leather Tanning	5.5	38.1	10.4	6.5	67	20.0	20.0
218	Structural Clay Products	5.5	26.0	10.1	13.5	72	29.7	31.4
366	Apparel Accessories	5.3	35.1	6.8	4.3	62	14.1	15.4
207	Sawmills, Planning Mills, Millwork	4.9	24.2	8.9	8.9	43	10.6	10.8
437	Footwear Except Rubber	4.2	71.4	7.7	1.9	52	26.2	26.1
408	Paints, Varnishes and Related Products	3.5	29.7	19.7	12.7	67	24.3	24.9
319	Misc. Food Preparations	2.8	21.4	21.5	18.5	72	37.2	44.9
208	Misc. Wood Products	2.6	16.8	8.7	7.5	47	20.0	21.1
307	Dairy Products	1.9	20.8	14.9	12.2	61	24.8	26.0
217	Cement, Concrete, Gypsum and Plaster	1.2	10.7	15.8	26.5	69	13.6	14.4
419	Misc. Petroleum and Coal Products	0.0	11.6	17.3	19.0	88	28.4	28.8
206	Logging	0.0	5.4	9.8	9.9	53	16.0	16.0

Table C-2

(i) Japan, Large-Scale Industries and Their Characteristics

SIC	NAME OF INDUSTRY	S1	S2	V/L	K/L	U	C(S)
31	Iron and Steel	47.0	65.5	2.18	3.28	56.3	52.9
36	Transportation Equipments	47.0	65.4	1.77	1.13	56.7	42 1
35	Electric Appliances	38.8	59.2	1.48	.64	47.5	48.7
26	Chemical Industry	34.6	64.3	3.14	2.92	80.5	46.9
32	Non-Ferrous Metals	30.7	63.5	2.10	2.29	52.9	53.7
28	Rubber Products	30.6	56.1	1.35	1.59	56.2	48.4
37	Precision Instruments	18.9	41.2	1.19	.49	27.7	43.0
34	Machinery	16.5	36.4	1.53	.83	57.6	39.3
25	Publishing and Printing	11.1	23.2	1.72	.70	28.1	30.2
24	Pulp, Paper and Related Products	8.5	27.3	1.46	1.74	31.6	37.4
27	Oil and Coal Products*	0.0	50.0	4.49	8.71	94.6	53.2

* Oil and Coal Products manufacturing industries are classified as large-scale industries because of the proximity of their general characteristics with large-scale industries as shown in this table, even though S1 is computed to be 0.

(ii) Japan, Small-Scale Industries and Their Characteristics

SIC	NAME OF INDUSTRY	S1	S2	V/L	K/L	U	C(S)
20	Textile Industry	8.0	28.7	.87	.65	40.0	18.6
30	Cement, Ceramics and Related Products	7.4	24.9	1.44	1.29	30.4	43.8
39	Misc. Manufacturing	4.7	16.7	1.16	.70	10.3	19.7
33	Metal Products	2.4	14.2	1.29	.71	14.9	19.4
29	Leather Products	1.9	13.8	1.05	.41	11.3	15.6
18	Food manufacturing	1.6	16.8	1.33	1.03	18.0	33.6
21	Apparels	1.1	8.4	.67	.27	15.6	14.8
22	Lumber and Lumber Products	.8	6.8	.90	.58	8.5	5.1
23	Furniture	.7	4.7	.96	.51	6.0	10.8

Notes to Tables C's:

(1) Manufacturing industries are sub-divided into two blocks (large-scale and small-scale industry blocks) in accordance with the percentages employment weight of large firms having 1000 and more employees in each of the individual manufacturing industries. Individual manufacturing industries are defined by the industrial classification system of Population Census for the United States and by the Standard Industrial Classification (two-digit) system for Japan. In the United States, 59 manufacturing industries (each is roughly comparable with three-digit industries defined by the Standard Industrial Classification) were used. In Japan, 20 two-digit industries were analyzed. In order to maintain the comparability between the two countries in terms of the type of industries, 20 and 8 percent were chosen respectively for the United States and for Japan as cut-off points of the percentage employment weight between large-scale and small-scale industry blocks. This difference in the cut-off points was inevitable due to the difference in the average size of establishments between the two countries. For further discussion on the grouping of industries, refer to Section 5 of Chapter III and Section 4 of Chapter IV.

(2) S1 is the percentage employment weight of large firms having 1000 employees and more in individual manufacturing industries.

(3) S2 is the percentage employment weight of firms with 250 employees and more in individual manufacturing industries.

(4) V/L is value added per employee. For the United States, the data were obtained from the U.S. Census of Manufacturers, 1967 and for Japan from the Japan Census of Manufactures, 1967. The units in Table C-1 are thousand dollars and in Table C-2 are million yen.

(5) K/L is capital stock per employee. For the United States K/L is computed as the sum of the book value of fixed assets and rental value per employee. The data were obtained from the U.S. Census of Manufactures, 1967 and the Annual Survey of Manufactures, 1968. The units in Table C-1 are thousand dollars. For Japan, K/L is the book value of fixed assets per employee. The data were from Japan Census of Manufactures, 1967. The units in Table C-2 are million yen.

(6) U is industry unionization ratio computed as the percentage of workers unionized to the total number of workers employed in an industry. For the United States, the estimates were made combining the data contained in the relevant issues of Industry Wage Surveys published during the period of 1960 through 1972 with the data prepared earlier by Professor Leonard Weiss (1966). I owe my deep thanks to his valuable help in making the estimates. For Japan, the ratio was computed as the number of union membership within a two-digit industry divided by the number of the employed in the industry. The data were obtained from Japan Ministry of Labour. *Rodokumiai Kihon Chosa Hokoku, 1967* (Basic Survay of Labor Unions), and the Census of Manufactures, 1967.

(7) C is industry concentration ratio in terms of the share of largest four firms in an industry. For the United States, industry concentration ratios are estimated by converting product concentration ratios using appropriate weights. In converting product-wise concentration ratios available from the Census of Manufactures to industry-wise concentration ratios, I used employment and shipment alternatively as weights. C (L) stands for the estimated industry concentration ratio using employment as weights and C(S) is the estimated industry concentration ratio using the value of shipment as weights. In making these convertions I have received important assistance from Professor Leonard Weiss. The data of C(S) for Japan were obtained from the unpublished document prepared by Japan Ministry of International Trade and Industry (1963) which provides estimates of concentration ratios of four largest firms by two-digit manufacturing industries as of 1963. Since the magnitude of change in concentration ratios during the period of 1963 and 1967 has been small, it is alleged that the use of 1963 cross-sectional data as an approximation of 1967 cross-sectional distribution concentration ratios across industries is permissible. For this point, see Kōseitorihiki Iinkai (Fair Trade Commission). *Nihon no Sangyo Shuchu, 1963 to 1966* (Industry Concentration in Japan). Tokyo: Tōyōkeizai, 1969. Professor Masu Uekusa has made it possible for me to use this data. I acknowledge his indispensable help.

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