Klaus Schömann

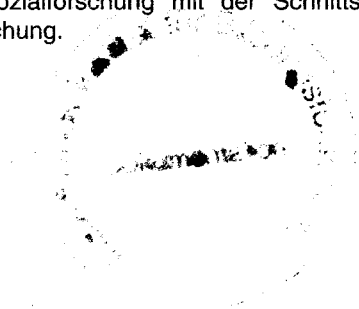# The Dynamics of Labor Earnings over the Life Course

A Comparative and
Longitudinal Analysis of
Germany and Poland

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Klaus Schömann, Berlin September 1994

1. Introduction

> "...it is necessary to make clear the inadequacy of both conceptions, that of the individual outside society and, equally, that of a society outside individuals. This is difficult as long as ... the concepts individual and society are understood as if they related to unchanging states."

> (Norbert Elias, 1978 p.250)

This quote, translated from the introduction to the 1968 edition of the seminal work by Elias on the civilizing process, appeared for the first time in 1939. It depicts the intrinsic tension which lies in the simplifiying definition of two independent spheres of life. The concept of methodological individualism as it is applied in economic theory and the concept of society as something existing outside and beyond individuals as encountered in sociology are quite inadequate in the search for explanations of social change and dynamic processes. Elias (1978) emphazises the need to elaborate the static notion of individual and society by thorough reference to empirical investigations, so that these concepts are no longer caught in the conceptual trap to remain static notions but refer to processes and social dynamics.

With regard to these deficiencies of prior analyses, I deliberately make the attempt to start with a theoretical concept of a socially embedded individual actor. As much as I consider the individual to be embedded into society I conceive an economic system to be embedded in a societal framework. This understanding of processes and the embeddedness of the individual in society, whereby societies are themselves understood as subjects of evolving processes, makes it necesssary to search for innovative approaches. Assumption of the individual to act as a completely autonomous decision maker without being subject to societal influences is quite inappropriate. Therefore, a socio-economic perspective in both theoretical and empirical investigations should be better endowed to explain some of the multiple interrelations between the individual and society. In taking such a perspective we attempt to elucidate the processes of wage attainment in contemporary societies during the post-war period. I have chosen the subject area of labor market phenomena since it allows to investigate quantifiable outcomes of labor market processes (mainly wages) using advanced quantitative methods.

Based on the view that structures of personality and of society evolve in an indissoluble interrelationship Elias (1978) advocates a theory of social change which distinguishes between changes relating to the structure of society and changes which are more independent of the structure. In his view adequate tools for sociological inquiry can distinguish between structural changes without a

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specific direction and those that evolve in a certain direction[1]. The approach taken here is very much in line with the one chosen by Elias (1978) whereby both types of structure, the individual and society, are not viewed as fixed, but as changing structures themselves and as inter-dependent aspects of more long-term development.

In connection with issues related to long-term development, we want to reiterate some of the reflections made by Elias (1984) on time. Time can be considered as a concept which allows a perspective on events which might otherwise appear without any relationship. It describes a way to link events or sequences of two or more continuous processes that are in motion. In a simple way time in the form of a calendar reflects the embeddedness of individuals in a world of many others in society. In referring to calendar time, it is possible to determine an individual's entry into social processes and locate it more precisely in longer-term development. This aspect of time can then be used to relate individuals to birth cohorts and these cohorts to processes of social change.

Considering time as both an experienced reference framework and a conscious element of choice it allows individuals to structure and synthesize events and view processes as related (Elias 1984). Such an understanding of the concept of time makes it an analytical tool in the study of social change as evolutionary or directional process. This work is intended to contribute to a concept of time by deliberately viewing labor market processes, theories and empirical investigations thereof, not just as implicitly embedded in time and space[2], but with explicit and definite reference to time and space.

The second major topic of the following chapters is to make a contribution towards the ongoing debate of micro-foundations of macro-phenomena and in more general terms towards the inerrelationship of micro- and macro-level analyses (Mayer 1989). Further, we scrutinize the explanatory strength of various

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[1] Such directional changes may happen over many generations without being locked into a deterministic vision of what society ought to be. An example would be the process of "ageing" societies. Social change can also be viewed as a process with direction but with the interest of how to influence its direction in favor of one's own ideological perspective, this view is clearly not in line with the Elias' perspective.

[2] For a discussion of existing labor market theories in economics and sociology we refer to section 2.8 of the dissertation where these theories and their shortcomings are analyzed. The work of embedding these theories in time and space is the subject of section 2.9 which makes an attempt to advance in the direction of embedding theories with the ensuing aim to derive testable hypotheses. I am well aware of the fact this approach constitutes a departure from the neoclassical understanding of the social sciences especially economics, where an embedding of economic theory in time and space would most likely be considered as an application of theory to a specific period, which might test the applicability of a theory to a specific period but not its more general validity.

theoretical approaches toward the micro-macro link including recent advances of game-theoretical approaches applied to the labor market. Life course or life history analysis, as defined by Mayer (1989), is another major innovation in our perspective on labor market phenomena. Life course analysis attempts the partial reconstruction of social structure and its changes on the basis of individual life histories. The aim of the work presented is to demonstrate how this approach constitutes a fruitful innovation towards the analysis of social change, labor markets and the relationship of education and labor earnings.

The following analyses have been part of a research program directed by Karl Ulrich Mayer to open up new approaches towards the analysis of the interpendency of how individual behavior translates into social structures and how the social structure determines individual behavior. One of the important preconditions for these attempts has been the availability of representative surveys of individual life histories based on a birth cohort design (Mayer 1979,1989). "Die Gleichzeitigkeit des Ungleichzeitigen von Individualgeschichte, kollektiver Lebensgeschichte und Gesellschaftsgeschichte wurde auf diese Weise empirisch faßbar" (Mayer 1989 p.8), which can be translated as: through the availability of such individual level longitudinal data it became possible to empirically capture the temporal connection of seemingly temporally unrelated events and processes, of individual life histories, collective life histories, and the history of society.

The principal research question which has guided the work is to what extent taking a life course perspective will enhance the explanatory power of theories. In close connection with this question we investigate whether taking such a perspective will lead us to observe new processes of the dynamics of labor earnings and, whether traditional empirical instruments suffice for testing of theories of the labor market taking a life course perspective. As "explanandum" we have chosen earnings trajectories which can be regarded as a substantial part of an individual's welfare over a person's entire life. This "explanandum" has the advantage over occupational status in that it does not make use of externally evaluated rankings of occupations, since it is deemed extremely difficult, if not impossible, to control for changes over time of such rankings and across societies.

Additionally, histories of labor earnings enable us to test the contributions of economic and sociological theory while keeping in mind that, especially in sociology, there is a strong tradition which argues that labor earnings may constitute a poor measure of individual welfare. However, a long tradition within economics had, and still has, a primary concern with labor earnings, or income in more general terms, as the following quote from Cannan (1914 reprinted in Atkinson 1983 p.1) demonstrates. "The two greatest ends of economic inquiry seem to me to be the furnishing of general answers to the two questions, first, why whole communities are rich or poor, and, secondly, why inside each community some individuals and families are above, and others below the average in wealth."

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We shall also study the distribution of labor earnings within and between societies but especially taking a life course perspective. Since the beginning of this century this research into labor earnings has witnessed various shifts of emphasis. The original attempt to analyze wealth in general has shifted to the analysis of the distribution of income. Research focused on the definition and measurement of the term income and the effects of various redistributional schemes such as progressive income tax, inheritance tax, child benefits, and students' grants.

In the early 60s the focus shifted again. Atkinson (1975) summarized this shift when he wrote: it may well be possible that differences in income simply reflect differences in age, since savings vary considerably over a person's lifetime and similarly people undergoing longer periods of training will originally earn less than others of the same age group, who already receive the benefits for some more years of work experience. Since earned income is most people's dominant source of income and since the dispersion of earned income is one of the major sources of income inequality we study the same phenomenon of the distribution of earnings within a society, but based on the life course perspective. This allows us to approach the difficult issue of intertemporal comparisons of welfare positions.

In more detail we shall analyze the changing structure of the education and employment system over longer periods based on a cohort perspective which considers a cohort to be a group of persons which is identified by common events. These can be date of birth, age of retirement or entry into the labor market. In more general terms members of a cohort share the same point in time as beginning of a life or labor market history, but subsequently differ in their experiences as time evolves (Blossfeld 1989).

In following three birth cohorts over time we can disentangle the interrelation of processes like full-time education and subsequent trajectories of employment from more general structural change of the education system or the occupational structure. Most empirical literature neglects the impact of structural change on, for example, earnings trajectories as it differentiates cohorts and creates cohort specific patterns of labor market experiences.

This study tries to take account of the interrelatedness of process by applying a dynamic perspective to the analysis of earnings trajectories which incorporates an exact location in time as the basis of any analysis of labor market processes. Exact references to time may consist in recording beginning and ending dates of labor market events such as starting wage on the first job or wage changes after a spell in unemployment. As the occupational career and time evolves there might be specific periods during the life course when job changes and ensuing wage changes occur more frequently. Similarly, longer run earnings histories will also be characterized by longer lasting periods of job stability in which we observe wage changes while pursuing the same activity.

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We argue that these events and processes are largely determined by specific forms of time dependency. One form of time dependency operates on the individual level and relates jobs over an entire individual job history, another one relates aggregate or social phenomena like the "baby boom" to personal experiences at entry into the labor market.

Time dependency, a third major issue, describes the fact that there might be specific periods in a person's occupational life and earnings history where decisions are taken depending on the existing opportunities, at that point in time, which might have long run consequences. Such periods might be characterized by the transition from the education to the employment system and hence the transition to the first wage on the first job under specific historical circumstances as those created by large cohorts of highly qualified labor market entrants. Accepting the view that these events in a person's life are a phase of high sensitivity (Blossfeld 1989) which determine many later events in the occupational and earnings trajectory of an individual, we shall pursue this question with particular emphasis in our empirical analysis. Particular emphasis will be put on the opportunity structures which allow to correct for inequalities at entry into the labor market and during later stages of a person's occupational career.

It is an integral part of the analysis to identify events which take place at different points in time, but still have very similar effects on subsequent earnings trajectories. Alternatively, putting the ordering of events and effects in reversed order, the same experience of a period of high unemployment among qualified people will have differential effects depending on the time at which this occurs during a person's occupational life course. We attempt to answer questions like, (1) what effects does the social structure and economic opportunities have on individual earnings trajectories, and (2) to what extent do these influences on the individual then have repercussions on the social structure.

Another major area of interest is the comparison of female and male earnings histories. We analyze what the effects of the social structure are, or more narrowly defined, the wage structure, on the differential occupational careers of women and men. Many studies have already addressed this issue (Baron and Bielby 1984, Blossfeld 1987, Helberger 1983, Müller,Willms and Handl 1983, Polachek 1981, Robinson 1986, Rosenfeld 1983), but their work has had its focus on the identification of sex segregation, that is the grouping of women into occupations which are characterized as dead-end careers, or with various forms of discrimination against women. A stringent application of the cohort perspective to the issue of differences in earnings as occupational careers unfold is still missing in this literature. In this research area we wish to address questions like the following: what is the effect of general social conditions, for example, the percentage of unemployed workers, on women's earnings trajectories. Many disadvantages of women in the labor market are only to be observed if a direct comparison is made to the earnings of comparable male workers.

In applying a cohort perspective to the discrimination issue we want to investigate whether subsequent birth cohorts of women face more favorable labor market conditions. More directly we address the issue whether different levels of education and different timing of entry into the labor market will have an effect on women's wage attainment. We hypothesize that these factors have a strong impact at the beginning of an occupational career, but much less during later stages of their professional career. Alternatively, it might be the case that inequalities which existed at the time of entry into the labor market have weakend or disappeared during later periods, and this created possibilities to compensate for disadvantages experienced at earlier stages.

These issues have not been studied from a dynamic cohort perspective in great detail. Additionally, we draw back on a larger number of labor market theories and the availability of longitudinal data to analyze these interrelated processes over a period of more than thirty years. Only such an approach enables us to identify any direction in the evolution of employment and earnings patterns or structural change.

Fourthly, we apply an innovative approach to the analysis of country comparisons. Out of the investigation of such complex issues as the interrelated structure of processes on the micro- and the macro-level, it was necessary to try new approaches toward cross country comparisons. In analysing two countries (West Germany and Poland) which rank on different levels of economic development and had systemic differences during the study period, we apply a historically incorporated country comparisons developed by McMichael (1990) to the comparison of labor market processes in the two societies.

This enables us to investigate longer term processes as processes which are subject to a twofold embeddedness (individual and social). An otherwise isolated individual level analysis, which is common practice in economics, is embedded in observable changes of the social structure and in long run historical processes. In pursuing such an analysis we draw conclusions which indicate directions of these long run historic processes. Such long run processes have been investigated by many researchers, but to our knowledge there are no studies which address these issues based on the connection of representative individual life history data and data of the social structure.

In the following chapter 2 we present a selection of theories relevant to this field of research. We start with the human capital theory and the status attainment approach and, subsequently, delineate theories which also contribute to our understanding of the distribution of earnings, its interrelationship with various socio-economic characteristics of individuals and other structural determinants of the labor market. Section 2.8 will discuss these theories of the labor market to derive a more interdisciplinary understanding of the two labor market processes subject of both economic and sociological analysis. Hypotheses guiding the empirical analyses are outlined in Section 2.9.

The empirical analysis of wage trajectories begins with the case of West German men in the post-war years in chapter 3. Considering earnings at various stages in a person's occupational career we analyze effects of education, age, and industrial sector on labor earnings and the impact of macro-level effects on individual earnings.

Chapter 4 will integrate the two previous chapters and pursue the testing of labor market theories by analysing and comparing earnings trajectories of women. The analysis is focused on comparisons of earnings differentials of women with different levels of education and the direct comparison of earnings trajectories of women and men. In analyzing sex differences in first wages, wage changes when changing jobs, and wage growth within jobs we conclude our inquiry of the interrelated processes of wage attainment within one society.

Based on an inquiry into the wage attainment process within one society and having introduced some methodological advancements, we proceed to the historically incorporated comparison of the process of wage attainment between societies which was the first topic in Cannan's (1914) research agenda. Chapter 5 reports our results from the cross-country comparison of wage attainment in West Germany and Poland. As a conclusion in chapter 6 we summarize our results, evaluate how many and how much of the guiding research questions we have been able to advance, derive some policy recommendations, and give a brief outlook on future research issues.

The appendix deals with methodological issues like the specification of earnings functions and the reliability of estimates based on retrospective life history data in order to demonstrate that the use of such data provides a worthwhile source of information which is still scarce in the study of labor market phenomena.

2. A Selective Survey of Labor Market Theories

In this chapter we present some major labor market theories which speak to the issue of labor earnings over the life-cycle and identify possible explanatory variables of variation in individual labor earnings. For the presentation of labour market theories we have chosen a somehow chronological order of their appearance beginning with an early model of the human capital theory, followed by an exposition of the status attainment approach[1].

We then continue with more recent approaches of labor market analysis which criticize some of the basic assumptions of the human capital tradition, notably the segmentation approach and screening type theories. Cohort analysis and vintage models are introduced in the following section to illustrate the importance of longitudinal analysis. Finally, we expound two fairly recent theories, efficiency wage models and search theory, which explain the same phenomenon of wage dispersion based on a different set of assumptions no longer depending on complete information and one unique market equilibrium.

2.1. Human Capital Theory

First references to human capital theory are found in Schultz (1959), Becker (1962), and Mincer (1962). In the introduction of the three papers we read the following common sense explanations why the authors apply an investment type model to human beings. Schultz (1959, p.109) states: "It is a simple truth that people invest in themselves. They do it as individuals and as families and through their national and local communities." Becker (1962, p.9) takes a similarly plausible argument as his starting point: "Some activities primarily affect future well-being, while others have their main impact in the present. ... education is said to affect both. ... This paper is concerned with activities that influence future real income through the imbedding of resources in people. This is called investing in human capital".

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[1] This order of presentation follows more the evolution of theoretical advances with an attempt to briefly sketch the history of ideas in this field of research. As a starting point we have chosen theoretical advances in the tradition of the micro-foundations of social and economic theory. Since the appearance of Smith's critique (1990) of the new structuralist analyses of earnings and the reply by Soerensen (1990) it needs to be pointed out that this ordering of theories is not to be misunderstood as a matter of superior generality of the one or the other approach. For a more comprehensive discussion of the explanatory value of the approaches we need to refer to the discussion of theories (chapter 2.8) and particularly the concluding comments.

A further dimension to the capital formation process is added by Mincer (1962, p.50):"In the context of the economist's concern with education ... it is important to be reminded that formal school instruction is neither an exclusive nor a sufficient method of training the labor force. Graduation from some level of schooling does not signify the completion of a training process. It is usually the end of a more general and preparatory stage, and the beginning of a more specialized and often prolonged process of acquisition of occupational skill, after entry into the labor force. This second stage, training on-the-job, ranges from formally organized activities such as apprenticeships and other training courses to the informal processes of learning from experience."

Each of the three quotations points at a different feature of investment in human capital. Schultz (1959) is mainly concerned with the wide ranging number of agents in this investment process in which all levels of society are involved, individuals as well as many other levels of aggregation of individuals. His major concern is the question **who is investing in human capital**. The theoretical analysis by Becker (1962) takes issue with the concept of marginal productivity of an additional year spent in education and identifies possible sources for present and future receipts and expenditures. His major concern is with the question of **what is investment in human capital**. Finally, Mincer (1962) identifies the institutions where this investment takes place such as the schooling system and taking a historical perspective, skills have been acquired though years of experience while working on a job. The focus of Mincer's perspective is **how the process of investment in human capital works in practice**.

A few basic observations gave rise to the formulation of the formal model of human capital. It is generally found across many countries that, first, personal income is very unequally distributed and, second, earnings and education are positively correlated. Third, variation in earnings within a society exceeds the variation of inherited ability and differences in schooling. Fourth, the distribution of earnings in a society is positively skewed and can be approximated with a lognormal distribution. Combining proposition one and two and including a time perspective yields observation five: variation of earnings within a given age cohort increases over time.

While the observations stated above are reflections on the level of a society, on the individual level the human capital theory regards an individual as making autonomous choices and taking actions to enhance personal earnings. The individual selects an amount of schooling in order to maximize his expected and appropriately discounted lifetime income, or generally his personal utility function. This process is subject to constraints such as financial resources, or a person's possibility to borrow funds to pay for direct costs of schooling and bear the costs in form of foregone earnings while in training. Benefits which accrue to this investment include the increase in expected lifetime earnings, job security, or working conditions more generally.

Optimal investment in human capital is achieved when equation 1 holds.

$$\sum_{t=0}^{n-1} \frac{R_t}{(1+r)^{t+1}} = \sum_{t=0}^{n-1} \frac{C_t}{(1+r)^{t+1}} \tag{1}$$

where R_t and C_t are receipts and costs during the life-time t, and r is the discount rate. Hence, the optimal investment results when the discounted value of expected receipts equals the discounted value of costs incurred (Becker 1962).

The most frequently employed model of human capital theory is the one developed by Mincer (1958, 1974) which is referred to in the literature as the schooling model. The model makes the assumption that all investment in human capital stops after leaving school and that there is no depreciation of human capital during the working life. This constitutes, however, a strong simplification of the original formulation of investment in human capital given by Becker and its general form of optimal investment in human capital as shown in equation (1). Mincer's model no longer allows for investment in human capital after entry into the labor force, or investment while on-the-job. Moreover, the concept of returns to investment in human capital is defined in a more narrow sense in terms of life-time earnings in monetary form. These simplifications of human capital theory applied by Mincer were primarily introduced to arrive at an empirically estimable earnings function.

In Mincer's model two persons of the same age or birth cohort are considered, one with s years of schooling and the other one with s-d years of schooling. When leaving school or university the one with s years of schooling will earn E_s and the one with s-d years of schooling earns E_{s-d}. The model assumes further constant earnings during the total working life for both persons with n being the age of retirement. Figure 1 shows a graphical representation of these assumptions.

Defining a discount rate r we can write the following two discounted future earnings equations for the two persons with d years difference of investment in schooling, where L stands for the discounted life-time earnings. Mincer no longer applies a discrete discounting process as in equation (1) but choses a process where discounting is continuous.

$$L_s = E_s \int_s^n e^{-rt}dt = E_s \frac{(e^{-rs}-e^{-rn})}{r} \tag{2}$$

$$L_{s-d} = E_{s-d} \int_{s-d}^n e^{-rt}dt = E_{s-d} \frac{(e^{-r(s-d)}-e^{-rn})}{r} \tag{3}$$

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FIGURE 1

Source : Mincer (1958)
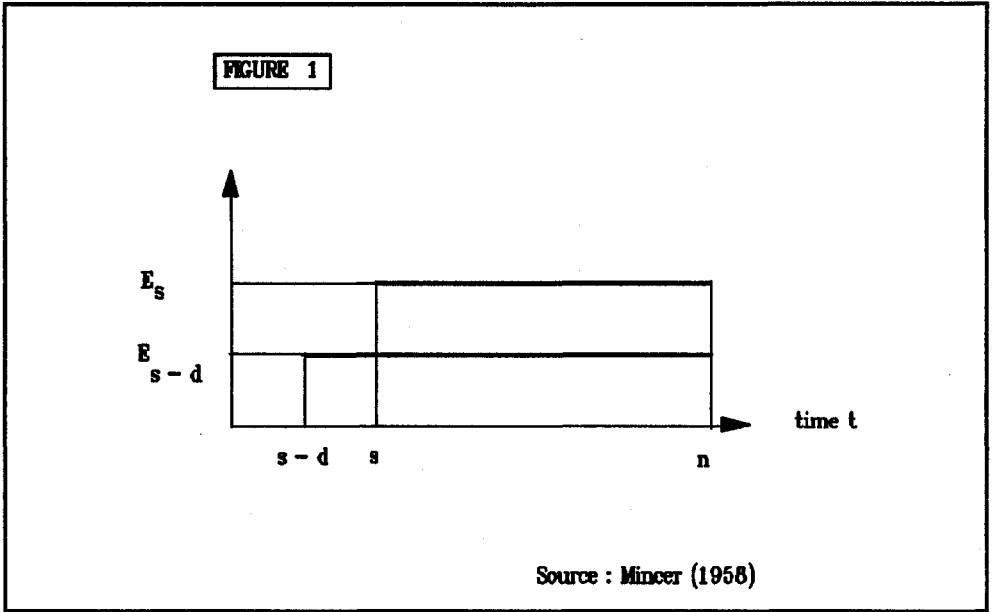
The model assumes the equality of L_s and L_{s-d}. If life-time earnings with s years of schooling L_s would be higher than with s-d years of schooling more people would continue their schooling up to s years. Since this increases the labor supply of persons with s years of schooling, earnings for this particular group of people with s years of schooling should decrease until a new equilibrium position is reached.

Under these assumptions we can write the following ratio:

$$\tau_{s,s-d} = \frac{E_s}{E_{s-d}} = \frac{e^{-r(s-d)}-e^{-rn}}{e^{-rs}-e^{-rn}} = \frac{e^{r(n+d-s)} - 1}{e^{r(n-s)} - 1} \tag{4}$$

In case the ratio $\tau_{s,s-d}$ is greater than one, people who spent more years in education receive a higher wage discounted at present value. It is also a decreasing function of n, the retirement age, since

$$\frac{\delta\tau}{\delta n} = \frac{r\, e^{r(n-s)}\, (1 - e^{rd})}{[e^{r(n-s)} -1]^2} < 0 . \tag{5}$$

differences in earnings will be smaller if the duration of the working life is longer. τ is also an increasing function of the discount rate r. At higher discount rates of future earnings differences in earnings will be larger. As is shown in

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equation 6 below τ increases with the duration of schooling s, which means the relative difference between earnings increases even if the difference in the duration of schooling stays the same. The model predicts a greater difference in earnings between people with 17 or 19 years of schooling than for those with 11 or 13 years of schooling.

$$\frac{\delta\tau}{\delta s} = \frac{r\,e^{r(n-s)}\,(e^{rd} - 1)}{[e^{r(n-s)} - 1]^2} > 0 \,. \tag{6}$$

A number of simplification of the basic schooling model have been introduced. First we can assume the duration of the working life to be the same for all individuals. Those who stay in education longer are therefore assumed to retire later from their professional life. With n being the length of the working life, s the number of years of schooling and r the discount rate, the present value of earnings is equal to:

$$L_s = E_s \int_s^{n+s} e^{-rt}dt = E_s\,\frac{e^{-rs}(1 - e^{rn})}{r} \tag{7}$$

$$L_{s-d} = E_{s-d} \int_{s-d}^{n+s-d} e^{-rt}dt = E_{s-d}\,\frac{e^{-r(s-d)}(1 - e^{rn})}{r} \tag{8}$$

By equating the total life-time earnings L_s and L_{s-d} we obtain a much simpler formulation of the ratio of life-time earnings τ.

$$\tau_{s,s-d} = \frac{E_s}{E_{s-d}} = \frac{e^{-r(s-d)}}{e^{-rs}} = e^{-rd} \tag{9}$$

In this equation τ is no longer a function of the level of schooling. It is only dependent on the difference of years of education between individuals (d) and the discount rate (r), which under perfect market conditions on the capital market would equal the interest rate. When comparing earnings of individual one with s years of schooling with individual two with no education, or only the minimum level of education, we arrive at equation 10 below.

$$\frac{E_s}{E_0} = e^{rs} \tag{10}$$

Taking logarithms on both sides of the equation yields the well known form of the schooling model:

$$\ln E_s = \ln E_0 + rs \ . \tag{11}$$

Interpreting this equation leads to statements such as the percentage differences in schooling are proportional to the number of years of schooling given a specific discount rate. A symmetric distribution of years of schooling in a society will be transformed to a positively skewed distribution of earnings. Earnings inequality, or the skewness of the earnings distribution are greater if the rate of return to investment in human capital is higher (Graham and McMahon 1989).

As mentioned above, the distribution of earnings is expected to be less unequal at the time of entry into the labor market than during later stages of a person's occupational life history. We can therefore expect that the schooling model is more powerful in explaining differences in earnings between persons early in their careers. A skewed distribution of educational attainments in a society will lead to an even sharper skewness of the distribution of earnings (Riboud 1978).

Testing this specification of the schooling model against a number of data sets and in many different countries suggested the extension of the schooling model to include the years of job experience in the basic model (Mincer 1974). Continuous employment on a job is considered to be similar to investment in human capital, as a form of investment through on-the-job training, or the general process of learning by doing. Since job experience and the learning-by-doing effect are strongest at the beginning of a job, this process has been modelled as a non-linear concave effect with the following form of the earnings function.

$$\ln E_t = \ln E_0 + r\ s + \beta_1 t - \beta_2 t^2 + \epsilon \tag{12}$$

where t equals the job duration or work experience, E_t is earnings capacity with t years of work experience, $\ln E_0$ can be understood as the constant of regression, r is the rate of return of s years of schooling, β_1 and β_2 are regression coefficients and ϵ is the stochastic error term of the equation.

Human capital theory has received a lot of criticism over its 30 years of existence with criticism being directed mainly at the basic assumptions of the model, such as the capital market characteristics and functioning of the product education, the unrealistic equilibrium assumption of life-time earnings, and ignoring multiple forms of market imperfections. This has led to a surge of alternative models to the human capital theory. Some of those we shall present in the following sections.

2.2 Status Attainment and Education

Status attainment research has its origin in the question about the social phenomenon of how people reach high or low status occupations. Contemporary industrial societies rely to a much lower extent on inheritance or ascription of occupations in the determination of its occupational structure. Much of research in the status attainment tradition attempts to identify factors which play a decisive role in the allocation of persons to jobs, other than a person's competence usually measured by a person's educational attainment. The status attainment tradition has stressed since the first models of socioeconomic career achievements (Duncan 1966, Duncan and Blau 1967) the role of a person's social or family background on the choice of career paths and achievement, as well as the more indirect effects of the influence of social background on educational attainment which then determines occupational status and career advancement (Duncan, Featherman, Duncan 1972).

The basic characteristics of the process of status attainment were already defined in this model. Figure 2 shows a graphical representation of the rudimentary model of the process of achievement. The bidirectional arrow simply reflects that there is a correlation between these two variables but since this relationship is prior to the process of respondent's occupational attainment it is not investigated in its causal details. Other straight arrows connecting two variables represent direct causal effects of one characteristic on the other. Arrows with no defined source of the effect are residual unspecified influences.

The family status originally defined as father's education and father's occupation (or head of household in more general termes) has later been extended to include mother's and siblings' characteristics as determinants of educational attainment and hence occupational status. The specification of the model in this form takes account of aspects of intergenerational mobility. The life course perspective of the occupational attainment process contributed the chronological and logical ordering of events and shifted the focus of research in occupational attainment in the direction of analysing job mobility in a dynamic setting (Carroll and Mayer 1986, Mayer and Carroll 1987).

Of particular interest in our analysis of education and earnings is the way in which education is viewed by the status attainment approach as a mediator between a person's social background and later occupational attainment or earnings. Each year spent in the education system advances a person on the "educational ladder" which will also determine the place on the "occupational ladder" during his working life because of the close link which exists between occupational achievements and educational attainment. From the very beginning the status attainment tradition stressed the importance of other intervening variables on educational attainment factors such as ability, intelligence, motivation, or aspiration as important determinants of educational attainment and

hence occupational achievements (Blau and Duncan 1967, Duncan, Featherman, Duncan 1972). In pointing up these other factors as explanatory factors in explaining occupational achievements and earnings during a person's occupational career this constitutes the major criticism of the status attainment approach toward the human capital theory as Soerensen (1990) attempted to rectify much confused debate on the difference of the understanding of the impact of education in the status attainment approach and human capital theory.

Most proponents of status attainment models support the derived prediction that education will be most influential for the first occupation and earnings. The impact of educational attainment at later stages during a person's occupational career will be of a more indirect nature as presented in figure 2 below.

Because of the similarity of predictions derived from the status attainment approach and those going back to the human capital tradition, both theoretical

Figure 2

Source : Blau and Duncan (1967)
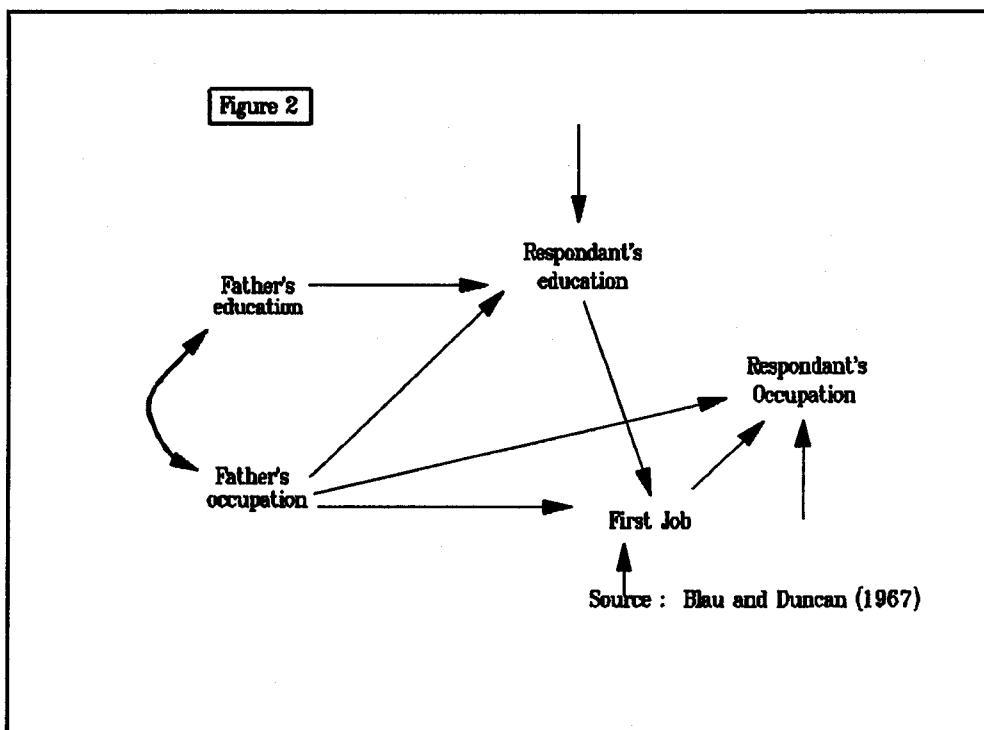
positions are frequently quoted together as they both stress the importance of education for later events in a person's occupational career or earnings trajectory. As the economists preoccupation lies with the measuring of returns to investment in education and training the status attainment approach sees education as one, though important, variable amongst others in the process of occupational achievements over the life-course.

2.3 Cohort Analysis and Vintage Effects

In the early sixties Ryder (1965) applied the concept of cohort analysis to the analysis of social change[1]. Members of a cohort are defined by entry into a system, in our case the labor market, during a common time span. The most obvious cohorts are birth cohorts where cohort membership is determined by the year of birth. With a rapidly changing environment each birth cohort will be born facing different social and economic conditions. A particular historical event might have a differential impact on each birth cohort and creates a time-uniqueness for birth cohorts. Cohorts are therfore identified through substantial differences in the timing of experiences (Müller 1978, Mayer 1987).

Demographers further distinguish cohort, age, and period effects. Age effects are present even if there would not be any social or economic change in the world surrounding the individual. Period effects, by economists frequently referred to as time effects, are the changing macroeconomic conditions in labor markets, product markets or world markets. A cohort effect is characterized by joined system entry, as entry into university, the labor market or retirement. Alternatively, one can also identify a cohort as for example the cohort of vocational training leavers. The latter approach has been followed by so-called tracer studies (Faegerlind 1975), which follow cohorts of school leavers for several years after graduation (Stegmann and Kraft 1987, Meulemann 1990).

These studies face often the shortcoming to analyze only short run consequences, or the particular incidence of the transition from the education system to subsequent employment, neglecting therefore effects of a temporary mismatch of own qualifications and requirements of the job, which might be corrected later during a person's occupational career.

Cohort effects have also been called vintage effects in models of education and labor earnings (Rosen 1976). The term was originally applied to models of economic growth. In the vintage growth models innovations are assumed to affect only new investment and, due to fast advances in technology the capital stock is composed of vintages. Transferred to subject area of education, the vintage model describes, that each birth cohort has the benefit of specific productivity improvements due to advances in teaching methods, contents of training courses or enhanced communication of existing knowledge between disciplines.

Vintages in labor market models are defined as cohorts having experienced a very specific historical event such as a specific time of entry in to the labor

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[1] First mentioning of a cohort type approach appears already in the writings of Karl Mannheim (1928) on the sociology of knowledge and the problem of generations during the late 1920s. Later this idea has been transformed into an instrument of demographic analysis throughout the 1950s and Ryder established the cohort as a concept in the study of social change in the early sixties.

market. Age-earnings profiles are similar for various vintages, but subsequent vintages start their age-earnings trajectories at a higher level. A possible alternative explanation is the existence of secular increases in wages which may be due to general economic growth and increases in productivity but independent

FIGURE 3

The Concept of Time in Socal Change
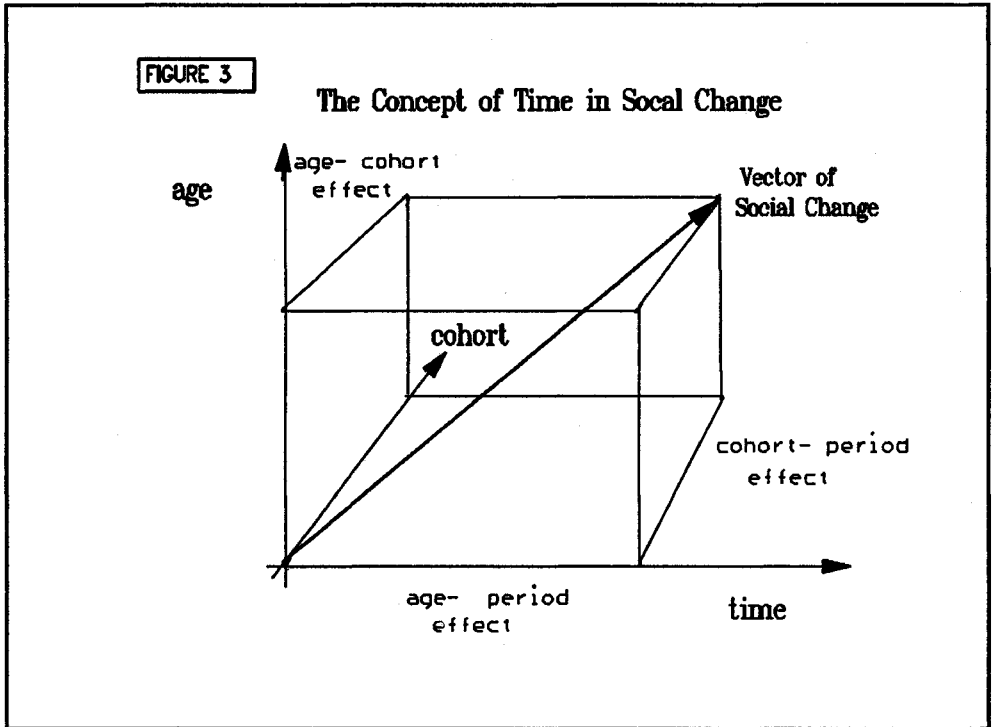
of the quantity or quality of worker training (Rosen 1987). In secular wage increases of this kind it is unclear which factor in production has created the wealth to be distributed through higher wages.

Welch (1979) proposes an additional kind of cohort effect. At any time during the life-cycle earnings are determined by the number of people who have chosen a specific type or duration of education. In this case vintage effects are inversely related to cohort size. Small vintages of graduates may reap high earnings throughout their career, whereas large numbers of college graduates from the baby boom generations may suffer simply due to the size of the cohort in respect to the number of vacancies in the labor market. Such cohorts face increased intracohort competition throughout their working life at each step of their career, which is most noticable at transition periods such as entry into the labor force.

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Cohort analysis applies simultaneously intercohort and intracohort comparisons to enhance the explanation of social phenomena. An intercohort comparison may focus on the relative size of one cohort compared to another cohort or cohorts, and intracohort comparisons follow the evolution of a cohort over time. Only through simultaneously applying inter-, and intra-cohort comparisons it is possible to precisely identify cohort, age and period effects.

A schematic representation of the interrelationship of cohort, age and period effects is given in Figure 3. In this three-dimensional figure we have drawn the three effects each as a different dimension of one single process. The area opened up by each pair of two effects allows, for example, the isolation of age and cohort effects if we take one single point in chronological time as in a cross-section analysis. This type of analysis abstracts from the chronological dimension of time. An age-period effect can be identified when we consider one single cohort as it ages and its evolution through time. Comparing various cohorts and their passage through time allows us to single out cohort-period effects.

Since we do not deal with orthogonal vectors but with vectors where some form of linear dependence between them is present, the actual evolution in time is characterized by the combination of these three time-related elements. However, the inevitable amalgamation of individual, micro-level time (age) and societal, macro-level influences through cohort size and the progression of chronological time shape one unique vector of social change. This vector of social change is embedded in a space of multiple micro- and macro level effects incorporating also international influences.

2.4 Segmentation Theories

The segmented labor market theory is built upon the hypothesis that, over time, the labor market has witnessed a fragmentation. The genuine model of labor market segmentation is the one going back to Doeringer and Piore (1971). Their dual labor market theory makes a distinction of the labor market in a primary and a secondary segment. Primary segment jobs pay high wages, offer good working conditions, stable employment patterns, good career opportunities and have established training and promotion procedures. Firms in this segment are usually large, capital-intensive, highly unionized and, sometimes, firms possess monopoly power in product markets.

Jobs in the secondary segment are badly paid, have poor working conditions and often include repetitive work. Firms in the secondary segment operate in highly competitive markets on small-scale projects. Industries in this segment are usually labour-intensive with high turnover of workers and little unionisation. The difference between labor market segments is not determined by technology, but through the existence of institutional and social barriers unrelated to prior investment in human capital. According to segmentation theories workers in different segments do no longer compete for jobs in one labor market. Access to the primary segment and mobility into the primary segment is restricted through the development of specific primary segment worker behaviour and personality traits. For workers in the secondary segment wages do not rise with additional investment in education or through accumulation of work experience. The criticism of human capital theory is focused on disadvantaged groups in labor markets whose earnings are poorly explained by differences in educational investment or job experience.

Primary segments have also been named internal labor markets. Firms may build an internal labor market for various reasons. One explanation for the existence of internal labor markets could be that firms have to compete with other firms to retain their highly qualified workers and attract new labor. Management together with labor unions in a firm, or industry wide, may come to agree on the implementation of a well-defined job hierarchy with rigid promotion ladders based on age and job tenure and few ports of entry for young workers. Such promotion procedures will ensure advantages of internal workers to those applying from outside the company not the least because the firm, or industry, provides good in-company training and on-the-job training which is strictly limited to company members only (Malcomsen 1984).

Together with job stability in primary sectors the labor market is characterized by a lack of job mobility between segments. According to Wachter (1974) secondary workers face the inability to be promoted to the primary segment because each segment imposes different behavioural requirements on its workers. Due to the kind of work pursued in the secondary segment its workers will

develop habits and characteristics which are incompatible with primary segment employment. Undergoing additional training efforts are not believed to be a remedy for the lack of intersegment mobility (McNabb 1987).

A more radical version of the segmentation theory describes the role of education in the class system of society as the institution which developes attitudes, behaviour, and personality characteristics which are in line with and reflect the ones required in the advantaged primary segment. Schools are already assumed to be the sorting mechanism for those who will find employment in the primary segment. The education system simply maintains the existing social order whereby schools in low-income areas transmit different values, attitudes, and personal characteristics than those located in high-income areas. Labor market segmentation is not to be overcome by providing more education for example to secondary worker's children as Reich, Gordon, and Edwards (1973) hypothesized for the United States and Bourdieu (1977) for some of the deprived suburban areas in France.

A less rigid but testable version of the segmentation approach is proposed by Stinchcombe (1979) who developed his scheme of industrial segmentation on the background of social mobility processes in Norway. He identifies two basic dimensions of an industry classification for industrialised countries: (1) prevailing conditions in product markets and (2) segmenting features in the labor market. His approach is very much based on the conviction that a theory of social mobility should first of all be a theory of what employers want or expect of their employees and secondly it has to take into account the kinds of structural constraints which impede or further these expectations. In particular the presence of a monopoly position or some form of protection in the product market and on labor markets will determine the extent to which a firm or an industry can develop its own status system or structure of the process of status attainment. It is these factors which determine to a large extent why some people earn wages substantially above the average wage or the wage most unemployed people are willing to accept.

Following Stinchcombe (1979) product markets of industries are distinguished into those where competition between many firms is present and new firms have easy access to these product markets, and those where entry into the product market is tightly controlled and only one or few licensed firms operate in them. The kind of monopoly power exercised may be due to barriers of entry, which governments or professional bodies regulate. In case of government regulation Stinchcombe (1979) mentions the examples of education, postal services, military and police work. Monopoly positions in product markets arise through regulation or licensing of professions and crafts so that services (as the product physicians or plumbers) can be obtained only from firms employing licensed professionals or craftsmen.

Monopoly power may also arise due to the fact that the minimum efficient scale of a plant is so large in relation to market size that only one firm can operate efficiently in this market. As capital intensity may impose restrictions on market entry so does possession of exclusive knowledge about certain technical matters determine quasi monopoly power in production. Such monopoly positions which make it difficult for competitors to enter product markets are to be found in industries with large economies of scale effects as in the production of iron and steel, but technical monopolies created through advancements in research and development leading to innovative products also lead to monopoly positions. The existence of an enforced legal system of patent laws enhances such monopoly powers. [1]

The second segmenting feature of industries constitutes the prevailing hiring practices in labor markets such as the skill level considered for recruitment. For example, an industry may rely mainly, or exclusively, on skilled labor to operate its machinery or, alternatively, unskilled workers are the predominant group of employees. An additional distinction in labor markets is due to the existence of jobs which are connected to property rights in the form of ownership of resources, assets, or exclusive rights to use resources.

Stinchcombe cross-classified two basic dimensions of industrial labor market segmentation yielding abundant theoretical combinations (compare Figure 4). He retains seven industrial segments with each being subject to distinct processes of labor control and different industrial organisation. Industrial segments defined in this way contain also a historical dimension. Industrial sectors have their own dynamics or life-cycle starting with a foundation period, an early period of expanding shares in gross national product, a peak, followed by a period of stabilization and declining importance. However, length of such periods varies considerably between sectors. The historical background of the foundation period plays an important role in shaping labor relations, unionization and government influence. Such early influences tend to remain specific characteristics of an

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[1] We need to point out that this type of industrial segmentation is developed to describe the social and economic history of the post-war period rather than to describe the industrial structure as might change during the nineties. Particularly in the government sector we witness multiple changes of these monopoly positions. In the education sector we find more and more that parts of it where state influence is reduced are becoming increasingly important, such as in efforts concerning further education and training of the employed. Deregulation of telecommunications services and parcels services, or private firms offering security services might need to be investigated as future issues and its influences on industrial labor market segmentation during the nineties. The internationalisation of product markets and the economic rise of countries not having signed the international convention on property rights of intellectual work might also contribute to lesson the position of monopoly power ensured by patent laws.
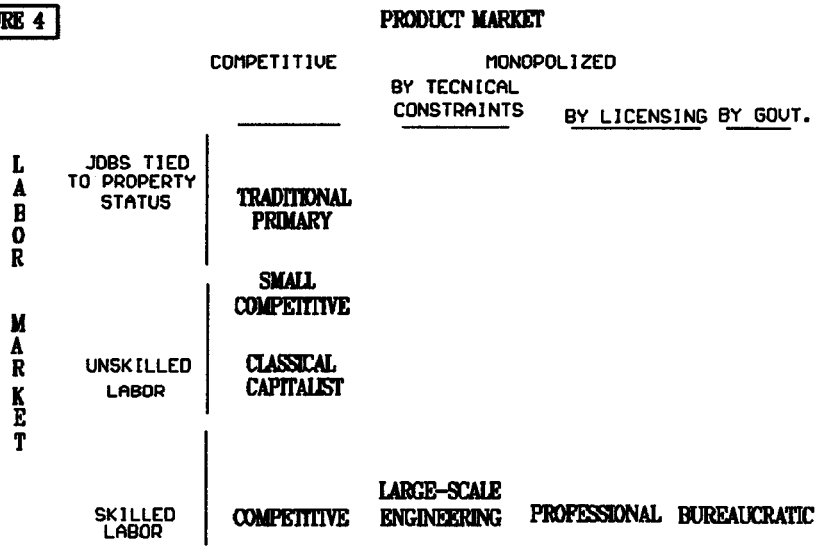
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┌─────────────────────────────────────────────────────────────────────────────┐
│  ┌──────────┐                          PRODUCT MARKET                        │
│  │ FIGURE 4 │                                                                │
│  └──────────┘         COMPETITIVE              MONOPOLIZED                    │
│                                             BY TECNICAL                       │
│                                             CONSTRAINTS    BY LICENSING BY GOVT.│
│                                             ─────────      ─────────── ────── │
│       ───────                                                                 │
│    L    JOBS TIED                                                             │
│    A   TO PROPERTY                                                            │
│    B      STATUS    │ TRADITIONAL                                             │
│    O                │  PRIMARY                                                │
│    R                │                                                         │
│                     │   SMALL                                                 │
│    M                │ COMPETITIVE                                             │
│    A                │                                                         │
│    R    UNSKILLED   │ CLASSICAL                                              │
│    K      LABOR     │ CAPITALIST                                              │
│    E                │                                                         │
│    T                │                                                         │
│                     │                                                         │
│                     │              LARGE-SCALE                                │
│         SKILLED     │ COMPETITIVE  ENGINEERING  PROFESSIONAL  BUREAUCRATIC     │
│          LABOR      │                                                         │
│                                                                               │
│                         Source : Stinchcombe (1979)                           │
└─────────────────────────────────────────────────────────────────────────────┘
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industrial sector transforming it into a relatively homogeneous industrial segment.

Below we define the seven industrial segments and derive hypotheses about earnings and mobility prospects within each segment. We begin with those segments where firms face vivid competition in product markets, they appear in the left column of Figure 4:

(1) Traditional primary industries (e.g., agriculture, fishery, forestry) are the segment which is dominated by small size privately owned enterprises relying to a large extent on helping family members and seasonal workers as their workforce. Low wages and sometimes difficult working conditions have caused extensive outward mobility from this segment for decades. Those remaining in the labor market segment are likely to receive rents due to property rights in addition to what are most frequently the lowest wages within an economy. Since the demand for products in these industries does not increase in line with productivity advancements and prices for products are low due to fierce (international) competition huge numbers of workers have been driven out of this industrial segment.

(2) Small competitive industries (e.g., wholesale and retail trade, hotels and restaurants, private services) are frequently still family enterprises with a small workforce of marginal workers, such as women working part-time, those trying to re-enter the labor force and migrant workers. Employers demand no special

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skills and trade union coverage of workers in this segment is almost unexistant. Competition between firms is strong because there are no entry barriers for new firms and enterprise foundation is achievable at low costs. In recent years competition has vigorously intensified because of the appearance of big multinational companies in the product market which, based on the principle of franchising, have spread rapidly across countries. This, however, has had little impact on traditionally low wages in this segment. Enhanced rationalization introduced by big companies operating internationnally may eventually lead to increased recognition of educational certificates within the segment and provide some possibilities of career ladders to occur.

(3) Classical capitalist industries (e.g., textiles, leather, clothing, food and drink, wood products, and plastics) are identified by Stinchcombe (1979) as small to medium sized firms selling in a highly competitive commodity market. The labor force consists of almost exclusively unskilled workers and industrial relations tend to be organized avoiding unionization of the work force. Despite traditionally low wages and little seniority positions in such firms many firms tend to be willing to offer wage premiums in return for low unionization. A low rate of technological innovation and easy replacement of the existing workforce through those currently unemployed has kept wages relatively low. Fierce competition in product markets and fluctuations in product demand are frequently compensated with varying size of the workforce. Stinchcombe (1979) suggested that in advanced industrial economies there will no longer be large numbers of such industries because we would expect such industries to leave high wage and high education economies. We might add that such industries will tend to move their production part of the enterprise to low wage countries or tend to specialize on some upper market high quality products making more use of highly qualified people. This however is describing more the trend of the eighties and nineties rather than the whole period of post war industrial development.

(4) Competitive industries (e.g., construction, printing, metal goods) are the ones with the most wide spread differences in firm size. The high diversity of end products allows a number of different size companies to coexist and cover different market segments or "niches". The segment offers some professional career perspectives to its skilled labor force mainly for reasons to motivate workers to learn specific skills. The manufacturing subsections of this industrial segment might be small producers of very specific products which tend to grow up in industrial areas producing parts used by other large-scale production firms in their process of production. Typically they also use a large amount of inputs which makes location next to industrial centres a competitive advantage. As company size varies largely so do wages offered in this segment, which entails a lot of gainful within segment job mobility.

(5) Large-scale engineering-based industries (e.g., primary metals, electrical machines, power and water supply, chemicals, coal, steel and oil) dispose of either monopoly power in product markets or the market is determined by very few big firms with oligopolistic behaviour. Origins for this strong market position are either economies of scale advantages or technological lead guaranteed by patent rights. These factors allow firms in this segment to pay higher than average wages to their skilled labor force. Higher than average wages and good internal career prospects are also used to safeguard against leakages of technological know-how to competitors and encourage additional productivity in plants where individual worker control is difficult to ensure. Career advancement is usually highly regulated and depends on either educational qualifications or seniority, or a combination of both elements.

(6) Professional service industries (e.g., education, health, churches, associations, arts, law, tax accounting,publishing, and private households) are characterized by a sharp internal difference between wages for the few highly qualified professionals and the many others with some lower end professional qualifications. The latter ones are frequently aspiring higher levels of professionalization and are therefore prepared to accept, at least temporarily, lower wages. Non-tangible rewards play the most important role in this segment. The segment has a high percentage of female workers partly due to the possibility of working more flexible hours than in other segments. Stinchcombe points at the characteristic of workers in this segment that the professionals have an occupational status usually obtained through the formal education system and credits and qualifications are valuable in many different organizations. The proximity of some of the occupations to volunteer work might be responsible for the low wages prevailing in this labor market segment.

(7) Bureaucratic service industries (e.g., government, banking, insurance) are identified through state-licensed monopolies, government services, and the finance industries with a similar type of bureaucratic organization. Characteristic tasks of work in this segment are the checking and processing of claims, claims against insurance policies or bank accounts or government duties. The segment with its formalized structures offers good career prospects and ensures competitive wages to its highly skilled labor force. Product markets are regulated by the government and controled by professional bodies which makes entry into product markets difficult for newcomers. Good career prospects and above average wages are therefore offered to keep workers attached to companies. Firms in this segment have developed extensive bureaucratic career structures and transferability of skills or competences between firms is limited in contrast to those firms classified in the segment of professional service industries.

Stinchcombe (1979) provides a number of detailed hypothesis on differential earnings trajectories due to industrial labor market segmentation. Some of the above mentioned labor market segments notably the small competitive industries,

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classical capitalist industries, and traditional primary industries resemble classical competitive processes in that such segments generally do not reward labor market experience and the number of unemployed will contribute to keep wages low in these segments.

Two hypotheses can be extracted concerning job changes: (1) a worker changing employer, industry, and occupation is unlikely to have gained much useful on-the-job experience for his new job. The wage change which results as a consequence of such job changes is minimal, since the worker has no particular advantage over lots of other competitors in the labor market, notably the unemployed. (2) In case a worker changes employer and occupation, but not industry, he might have gained some valuable job experience but the effect on wage gains due to job changes between employers is also expected to be small in comparison to, for example, those who change employer and industry but not their occupation.

This typology of seven labor market segments appears particularly suitable to our longitudinal analysis because it provides a historical view of industrial segmentation including statements concerning the dynamics of industrial segmentation. The central premise of his segmentation approach is to demonstrate that a crucial component has been neglected in traditional status attainment models. It is employers who determine labor market values and occupational status of employees rather than employees themselves through their educational attainment. The segmentation approach using industrial segments has the further advantage that it reflects well additional labor market dimensions such as the distribution of women and men across the industries and the identified industrial segments vary also in respect to the degree of unionization of the labor force within an economy.

A further interesting prediction which we can derive from the segmentation approach from Stinchcombe (1979) is that education which plays a predominant role in models of human capital investment and status attainment will only be important at the beginning of the occupational career of a person, since at that stage of the career it is teachers rather than employers who do the evaluation of workers or potential workers. During later stages in a persons´ job history the initial amount of general education received before entering the labor market will be negligable, because the criteria for evaluation of employees used by employers might differ largely from those applied by the teaching profession. An idea which is presented in more detail in the following section.

2.5 Screening and Filter Theories

Models discussed in this section relax one of the strict assumptions of the previously discussed models of the labour market. It is no longer assumed that agents in the labour market can make decisions assuming perfect information about available options and outcomes of their choices of educational levels (Arrow 1973). For example, they might be unaware of the consequence to be a member of a large birth cohort and the effects this has on their labour market opportunities and wages. These models are built within the framework of decision making under uncertainty.

Since acquiring information about jobs and workers involves costs, there is little incentive for agents in the labour market to acquire complete information on job or worker characteristics. For example, a firm will stop searching as soon as the marginal costs of additional information will exceed the marginal benefit of a particular piece of information. There are two kinds of information on workers and jobs. On the one hand, there is information observable by inspection such as age and qualifications, and on the other hand, there is information which is only observable by experience like reliability or creativity. However, in order to avoid costly periods of prospecting employees try to infer from available information what the likely unobservable characteristics are. Out of this rationale the screening hypothesis and search theories (see section 2.7) were developed.

The screening hypothesis argues that education adds little to the direct productivity of a worker, but rather education acts as a filter or screening device through which pre-education talents, like intelligence and motivation, can be identified by employers in prospective workers. Education is seen not to provide skills which increase a worker's productivity and consequently his wages. Educational credentials certify a worker's trainability assuming that productivity is only increased through on-the-job experience (Arrow 1973). This hypothesis explains why educational credentials for many occupations, as demanded by employers, tend to increase over time. If younger birth cohorts obtain more credentials as their predecessors this will lead to inflation of the value of the credential to holders of the credential as well as to employers using a credential as a screening device.

The attempt to economise on information costs has the consequence that employers rely on certain signals if they have to decide between a number of applicants. Such signals can be a particular name of a university, an apprenticeship within a specific firm, or even spare time activities. However, in their choice of educational programs workers respond by prefering courses with high signalling value, but some of those might have lower educational content. Some firms or institutions may become known as good signallers. For example, in secondary education a particular school may be a good indicator of a successful future career. As soon as this becomes known to more pupils applications to that

school will rise quickly. Consequently the signalling function can only be sustained if the selection procedure tightens, or the real signalling function will soon be lost.

Winkler (1987) presents the basic screening model in diagrammatic form as shown in Figure 5. The model describes how information about education and costs of education determine choices concerning the amount and kind of education people choose. Through the many employees with various educational credentials firms directly observe the relationship between education and on-the-job productivity. Based on these observations firms establish their beliefs about the link between educational credentials and measurable on-the-job productivity. According to their observations and derived beliefs firms determine the wage level they offer to each educational credential. These wage offers, assuming they are known by all agents in the labor market, guide the choice of subsequent birth cohorts in their choice of duration and kind of education. The equilibrium position of this process is achieved when employer beliefs, wage levels and choices of educational credentials are reconfirmed.

An extreme form of this signalling model (Spence 1974) states that it might even be the case that education adds nothing to the productivity of a worker but it serves as a good predictor of the true quality of a worker. This form of signalling is also known as credentialism, since it is no longer the educational content of training that is important, but the credential having attended a certain

| FIGURE 5 |

Costs of education

Choice of educational categories ⟶ Actual empirical relationship between education and productivity

Wages offered to different categories of education by employers ⟵ Employers' beliefs about relationship between education and productivity

Source: Winkler (1987)
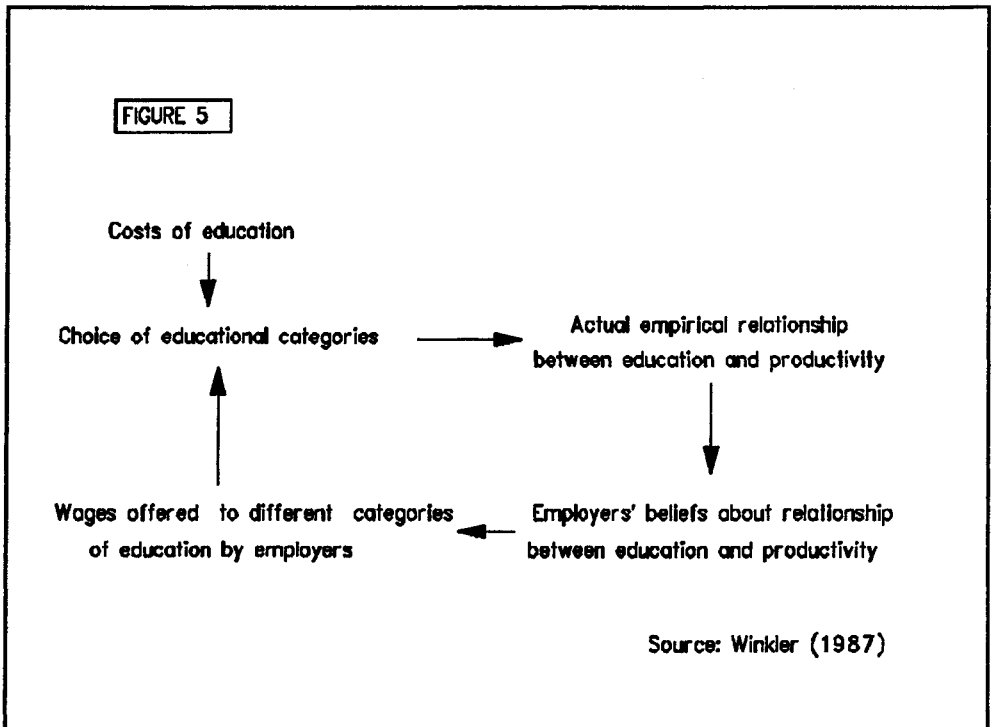
course. The model allows for more than one equilibrium position, one of which may consist in the systematic overinvestment in education (Spence 1974).

If employers dispose of their own test instruments which effectively sort individuals by their productive ability (Winkler 1987) the costly screening through the education system could be replaced or augmented by such a device. Firms in possession of such an evaluation system will replace the educational screening with their internal screening device to ensure internal career advancement or wages in line with a worker's observed productivity and a kind of potential productivity.

2.6 Efficiency Wage Theories

Only fairly recently a group of models has appeared under the label efficiency wage theory. Research interest in the theory has been spured by its amalgamation with keynesian macroeconomic theory. Since Keynes' General Theory (1936) economists observed that with sticky money wages the labor market would not return to equilibrium and some involuntary unemployment is the consequence in absence of sufficient aggregate demand. But why should wages be sticky? There has never been a plausible theory which suggested it is rational that wages above the market clearing level should be persistent when there are many workers willing to accept jobs for even lower money wages.

The efficiency wage hypothesis maintains that the productivity of workers depends on the real wage paid to him. Wage cuts therefore have negative effects on a worker's productivity and increase costs of production possibly by more than the wage cut saves money for the firm (Akerlof 1982 and Yellen 1984). Four reasons suggest why it might be rational for a firm to pay a wage above the full employment equilibrium wage: (1) Workers are expected to reduce shirking because of the higher costs of a job loss, stressing the discipline function of aggregate unemployment for individual work efforts. (2) Labor turnover will be reduced, which leads to lower training and administrative costs. (3) Higher quality workers will apply for jobs since higher quality workers have higher reservation wages. (4) Morale of the whole labor force in a firm will improve.

Akerlof and Yellen (1986) claim that slightly extended versions of the efficiency wage models can also explain wage rigidity, labor market segmentation, the existence of wage distributions for workers of identical characteristics, and discrimination among observationally distinct groups. If a firm is forced to cut its wage bill for whatever reasons it will respond with no change in the efficiency wage but it will reduce the number of workers, in other words, it will respond with a "quantity adjustment" and the price for labor remains constant.

Efficiency wage theories are of interest because they fill a long lasting gap in the microeconomic foundations of macroeconomic policies, especially policies concerning the aggregate demand for labor. A topic which efficiency wage models have not yet delt with is the role which different educational levels play in the theory, and whether it is possible to formulate testable hypotheses on the effects of education on wages, shirking and unemployment.

As in the previous paragraphs we delineate only one early model of each theoretical orientation. We have chosen the model of Shapiro and Stiglitz (1984) as the basic efficiency wage type model since it captures the effect of unemployment as a worker discipline device. The model, though developed in the neoclassical tradition, recognizes that the competitive equilibrium of an economy in general will coincide with an inefficiently high level of unemployment.

The basic model assumes n identical workers who dislike work effort but like consumption. Individuals have instantaneous utility functions of the form U(w,e) where w is the wage and e is the effort put forth. Further assuming separable utility functions and risk neutrality a normalized utility function can be written as U = w - e. The effort level is either equal to zero or a positive value, $e \geq 0$. In the event of being unemployed a worker receives unemployment benefits $\underline{w}$ and e=0. Workers are either employed or unemployed and face a probability b per time unit to be dismissed. Workers maximize their utility, e.g. their expected present discounted value of utility with the discount rate r > 0. They maximize[1]:

$$W = E \int_0^n u(w(t),e(t))\exp(-rt) \, dt. \qquad (13)$$

Workers choose their effort level e to maximize their discounted utility stream. They receive a wage w in case they do not shirk or until exogeneous reasons may lead to a separation from the firm. In case he shirks there is a probability q that he will be found out to do so and be dismissed. In order to maximize their utility workers compare the utility from shirking and full work effort. $V_{E,S}$, $V_{E,N}$ and V_u are expected lifetime utilities of an employed shirker, an employed nonshirker, and an unemployed individual. In form of an equation we express this for a shirker as:

$$r \, V_{E,S} = w + (b + q)(V_u - V_{E,S}). \qquad (14)$$

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[1] Individuals who are assumed to be infinitely lived maximize their expected present discounted value of utility with a positive discount rate r. Lending or borrowing is not allowed in the modelling framework, individuals are assumed to be risk neutral so that the discount rate r reflects a pure rate of time preference. These usual assumptions place the model firmly in the information- theoretic neoclassical tradition.

For the nonshirker we write:

$$r\,V_{E,N} = w - e + b(V_u - V_{E,N}).$$

(15)

Solving equations (14) and (15) for $V_{E,S}$ and $V_{E,N}$ we obtain

$$V_{E,S} = \frac{w + (b + q)V_u}{r + b + q} \quad (16) \qquad V_{E,N} = \frac{(w - e) + b\,V_u}{r + b} \quad (17)$$

In case $V_{E,N} \geq V_{E,S}$ holds the worker will choose not to shirk. A no-shirking condition (NSC) is derived by Shapiro and Stiglitz (1984) using equations (16) and (17).

$$w \geq rV_u + (r + b + q)\,e/q \equiv w° \quad (18) \qquad \text{or} \qquad q\,(V_{E,S} - V_u) \geq e. \quad (19)$$

The no-shirking condition implies: unless there is a penalty associated with being unemployed, everybody will shirk. Put differently, if an individual would immediately be re-employed after being fired, that is when $V_u = V_{E,S}$, the no-shirking condition would never be satisfied for any individual. Alternatively, setting wage $w°$ sufficiently high will prevent workers from shirking.

The critical wage $w°$ will be higher if the required work effort (e) is higher as well as $w°$ will be higher in case the expected utility of being unemployed (V_u) is higher. Similarly $w°$ is higher with higher values for r the interest rate and b the quit rate. High interest rates favour short run gains due to shirking, and higher quit rates encourage shirking because of the increased probability of leaving the firm soon. Of particular interest is the implication that the critical wage $w°$ will also be higher the lower the probability of being found out shirking (q).

For purpose of the model Shapiro and Stiglitz (1984) assume that there are M identical firms i=1,...,M in the labor market with production functions of $Q_i = f(L_i)$ for each firm, where L_i is firm i's effective labor force. This yields the aggregate production function of $Q = F(L)$. It is assumed that the monitoring technology is given exogenously and monitoring of effort is impossible through observing the output. Firms fire shirkers, who then receive $\underline{w}$ which corresponds to the unemployment benefit and offer wage w to all other employees.

Since firms have an interest to keep $\underline{w}$ as low as possible because it also influences their wage offer w through the no-shirking condition (NSC), $\underline{w}$ will equal the minimum legal wage. To encourage work effort a firm will offer $w=w°$ and by equating the marginal product of labor with costs of taking on an additional worker the firm's labor demand is given by $f'(L_i)=w°$ and similarly for aggregate labor demand $F'(L)=w°$.

The market equilibrium is reached when a firm takes the market wage and the corresponding employment level as given and the firm has no incentive to offer a different wage level. V_u, the expected utility of an unemployed worker will determine the firm's wage setting behavior. In an off-equilibrium position where wages are too high a higher unemployment rate will constitute a higher detering effect on workers to shirk even if the firm starts lowering wages. Similarly, if market wages are below the equilibrium level the incentive for workers is not high enough in relation to unemployment benefits to provide high work efforts. Low unemployment in this market position implies that the duration of unemployment after being dismissed due to shirking are very brief. Hence, in an off-equilibrium position there is a tendency to return to the market equilibrium wage $w°$.

Since V_u is needed to calculate the equilibrium wage we write V_u explicitly corresponding to equations (14) and (15):

$$r \, V_u = \underline{w} + a \, (V_E - V_u) \tag{20}$$

where a stands for the job acquisition rate and V_E is equal to $V_{E,N}$ in equilibrium. Solving (17) and (20) together for V_E and V_u yields:

$$r \, V_E \; = \; \frac{(w - e)(a + r) + \underline{w}b}{a + b + r} \tag{21}$$

$$r \, V_u \; = \; \frac{(w - e)a + \underline{w}(b + r)}{a + b + r} \tag{22}$$

Introducing (22) into the no-shirking condition (18) will give the aggregate no-shirking condition.

$$w \geq \underline{w} + e + e(a + b + r)/q \tag{23}$$

The critical wage for non-shirking behavior is higher for higher level of unemployment benefits $\underline{w}$, higher work efforts e, higher quit rates q and increased possibilities to leave unemployment. As earlier the critical wage needs to be higher if the detection probability of shirkers q is low.

Introducing a dynamic view into the model through a steady state equilibrium we have b*L as the flow into aggregate unemployment and a*(N - L) as the flow of those leaving unemployment, where N is the total labor supply and L is aggregate employment. by equating the flows and solving for a we obtain

$$a = bL / (N - L). \tag{24}$$

Substituting a into the aggregate no-shirking condition (23) yields

$$w \geq e + \underline{w} + (e/q) \,[bN / (N-L) + r] \quad \text{or} \tag{25}$$

$$= e + \underline{w} + (e/q) \,(b/u + r) \equiv w° \tag{26}$$

In equation (26) (N - L)/N has been replaced by the unemployment rate u. Figure 6 shows a graphical representation of the aggregate no-shirking condition. In a situation with full employment there will always exist some shirking. In case L=N a is so high that a worker found to be shirking would be rehired by another firm. If workers have this information they will always chose to shirk unless other external factors to the model prevent him to do so.

Market equilibrium (E) is achieved when firms accept the level of the job acquisition rate a as given, which leads them to offer wage w° and adjust the size

FIGURE 6

Source: Shapiro and Stiglitz (1984)
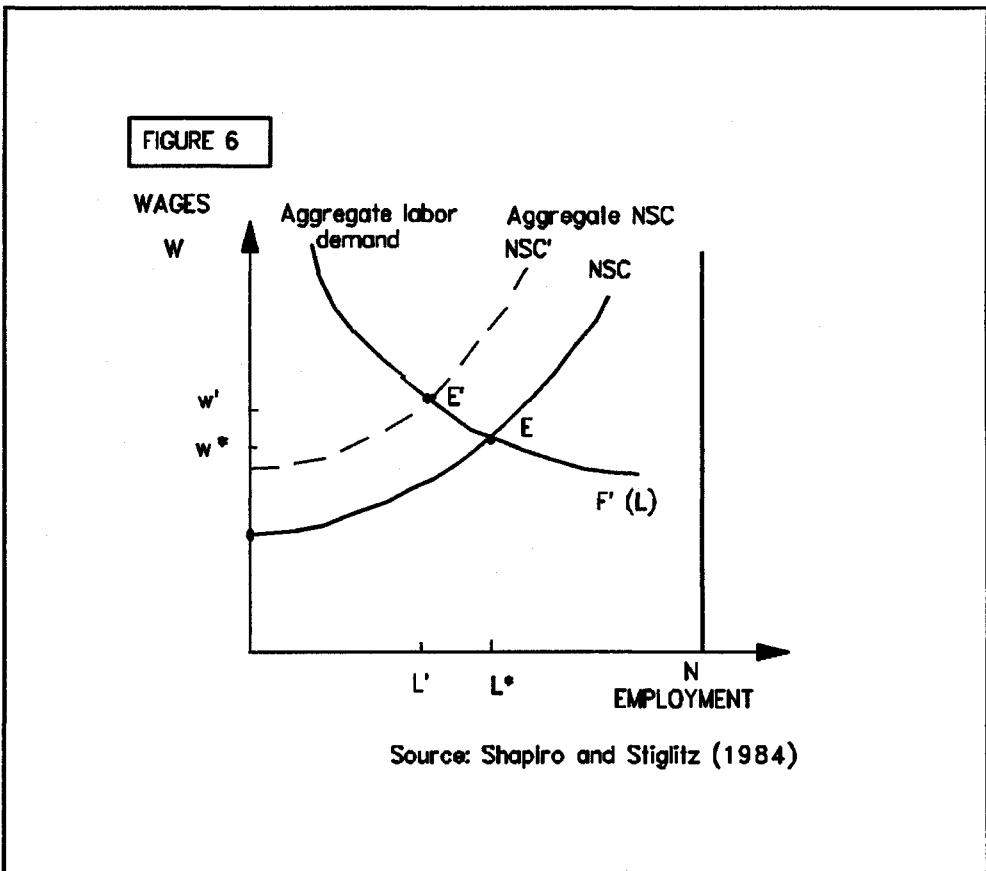
of their labor force accordingly. Assuming $\underline{w} = 0$ for simplicity equilibrium is achieved when

$$F'(L) = e + (e/q)(bN/(N - L) + r). \qquad (27)$$

In equilibrium (E) firms have no incentive to change their wages, since lower wages increase shirking and workers are involuntary unemployed at w^* but lower wages which they are willing to accept cannot sufficiently deter them from shirking.

Comparative Statics demonstrate that an increase in the quit rate q and a lower probability to be found out shirking will shift the NSC-curve upwards and E' in Figure 6 is the new equilibrium with a higher wage w' and a higher level of unemployment. If unemployment benefits $\underline{w}$ rise this shifts up the NSC-curve and lowers the labour demand curve with the consequence of higher unemployment. Wages are relatively sticky downwards because if they are below a certain level shirking of those currently employed will increase. It is high unemployment rates as deterrent which can allow wages to come down to full employment levels eventually.

Shapiro and Stiglitz (1984) discuss several extensions of the basic model. One is the monitoring intensity. If workers are monitored in a stricter way a higher wage needs to be paid because of the lower probability to get away with shirking. The development of internal labor markets in a firm will discourage workers from between employer job shifts and increase the costs of unemployment hence the penalty for shirking. The introduction of performance bonds which workers loose if they are found out shirking will lead firms eventually to hire predominantly younger workers who are prepared to build up such a bond but where firms can benefit from dismissing them early if the company's reputation as a good employer is not threatened.

Allowing for heterogeneous workers opens up the possibility that some workers carry a stigma of being more likely to shirk after they have been dismissed by a firm. The stigma may already serve as a discipline device rather than actual unemployment rates. Some workers may be concerned about their reputation as diligent workers and be deterred from shirking by the existence of the stigma. Others, probably less qualified workers, are less concerned about their reputation and be more deterred by actual high levels of unemployment.

2.7 Search-theoretic Explanations of Labor Earnings

Search theoretic approaches of the labor market have taken issue with the assumption of the well-informed decision maker with perfect foresight into the future. In the realm of our analysis of the relationship of education and earnings this is expressed with the criticism of the assumption of the human capital theory that people have precise ideas about future expected earnings according to various choices of occupations and investment in schooling.

Job search theories offer another explanation of persistent inequality in earnings, but in search-theoretic considerations inequality in earnings will arise because people with identical qualifications may follow different job search strategies. Some search only in local labour markets, some search interregionally. Some search solely through formal sources of information, while others make use of informal contacts. Workers vary also in their ability to finance longer periods of search especially when searching while unemployed. On-the-job search, as differentials in search efficiency, will lead to the occurrence that only a certain group of people will obtain access to certain kinds of well-paid jobs (Mortensen 1986 and McKenna 1985).

Developments in the tradition of job search and earnings are based on a formal wage search model which has been derived from the theory of sequential statistical decision theory, it is constructed in the form to deal with a worker's decision of looking for a job and deciding which offer to accept in a decentralized labor market. Information on job vacancies, their location and remuneration needs to be acquired in a process involving some costs of search and the information on observables of firms job offers is also regarded as being imperfect (Mortensen 1986).

Following McKenna (1985) in the case where firms are not distinguishable ex ante and searcher has a random approach, there are two basic strategies of job search. In the first strategy the searcher makes a choice on a particular number of firms to be inspected and then accepts the best wage offer received within this sample. This has been named a fixed sample size strategy. Alternatively, the person searching a job can decide on each contact with a firm whether he will accept the offer and stop searching or whether the firm's job offer should be rejected in order to continue the search process and contact another firm. This strategy is referred to as a sequential search strategy.

Much of the debate of the relevance of the search-theoretic approach has focused on the impact of reservation wage behaviour on the duration of unemployment spells or the probability of leaving unemployment. A person's reservation wage is defined as the mimimum wage a worker will consider acceptable based on his previous employment history, his previous wage, and expectations formed about the labor market. Some models of job search go as far as specifying the factors determining the reservation wage and indirectly the

duration of unemployment. Parameters influencing the reservation wage are search costs, the wage-offer distribution, a discount factor associated with the determination of the reservation wage, but also the arrival time of offers, attitudes toward risk, moving costs, past experiences and other personal characteristics among those education, search efficiency, age, sex or family status (McKenna 1985).

Mortensen (1986) points out another feature of job search theory. An extention of the standard wage search model allowing search on the job with endogenous work effort levels predicts similar to the human capital model the observable negative relationship between the wage earned on a job and the probability to leave the current job within a firm, hence explaining increasing wage-experience profiles. In contrast to the human capital theory, which stresses the link between a longer job duration (tenure) that will raise productivity and therefore wages, the search-theoretic approach favoures the view that a job-worker match has many characteristics which cannot be observed in advance but need to be experienced. These experiences by inspection allow further information on the expected future quality of a job-worker match relative to other opportunities in the labor market. There are continuously decisions taken involving each a varying degree of uncertainty on the quality of a particular job-worker match. This view of the labor market therefore predicts a high turnover rate among young workers, that is among those who have a short employment history and still little experience of job opportunities and possible job-worker matches.

Search theory has also made contributions toward the view whether there can be wage dispersion when the labor market is in equilibrium. Since general competitive economic theory does not allow for more than one price in equilibrium the model shown below demonstrates that even when the labor market is in equilibrium there will be a wage dispersion across different industrial sectors. As well as challenging general equilibrium theory and the human capital theory within this research tradition, this view is incorporating one of the basic intuitions of the segmented labor market theory.

The recent extension of the search-theoretic approach by Montgomery (1991) takes coordination problems in the labor market as given and no longer assumes with the standard competitive model of the labor market that homogeneous workers will receive equal compensation across firms. The fundamental difference to models classified under the human capital theory is the assumption of the existence of wage dispersion even when the labor market is apparently in equilibrium.

The basic intuition of the search-theoretic model by Montgomery (1991) is the observation that the probability of recruiting for a vacancy is higher the higher the wage offer for this position. The existence of firms with differences in profitability and in capital-labor ratios creates special outcomes which constitute a background for labor market activities of firms. Costs of vacancies for firms

with different capital-labor ratios may vary largely so that firms belonging to particularly capital intensive industries are very likely to offer higher wages to fill vacancies quickly. Montgomery (1991) derives from these assumptions that interindustry wage differentials may be persistent, which means they are an equilibrium phenomenon, and they are correlated with capital intensity.

The search-theoretic model by Montgomery (1991) is built on the basis of a 2 x 2 noncooperative game[1]. Firms chose the wages they will offer to prospective workers. Each applicant can apply to only one firm. In case applicants choose different firms both will be hired, in case they apply to the same firm the firm tosses a coin to decide between applicants. The extensive form of the application game can be represented as shown in figure 7 where Sp1,Sp2 are player 1 and player 2, and F1,F2 represent firm 1 and firm 2. The top two lines of figure 7 are then pay-offs of player 1 and 2. In case player Sp1 choses to apply to firm 2 and player 1 applies to firm 2 as well both players will receive the wage offered by firm 2 with the probability of one half. The pay-off for both players is $1/2w_2$.

Assuming that wage offers of firms are not too far appart this game has three Nash equilibria[2]. Leaving the two asymmetric pure-strategy equilibria (firm 1, firm2) and (firm2 firm1) apart, we consider the mixed-strategy equilibrium in which a worker applies to firm 1 with probability (p) and to firm 2 with probability (1-p). The wage offer set by a firm will influence the probability of people looking for a job to apply to them.

The equilibrium condition is:

w_1 * pr(getting job at firm 1) = w_2 * pr(getting job at firm 2)   (28)

which determines that expected values of applying to a job are constant across firms. For applicant 1 the probability of getting the job at firm 1 can be put in form of an equation. For applicant 1 we can write the equation as follows:

---

[1] Montgomery demonstrates in his article (1991) that the major results of the 2 X 2 case hold also in the case of a large labor market with many firms and many applicants. The distinction in cooperative games and noncooperative games was first introduced by Nash (1950) who defined noncooperative games as games where players do not communicate or can rely on enforceable agreements

[2] A Nash equilibrium is defined as a strategy combination with the property that rational players will always choose a strategy combination that is self-stabilizing so that a player has no incentive to deviate from the strategy when he expects all others to do so. An equilibrium point is reached when players always choose a strategy combination with the porperty that every player's strategy is a best reply to all other players' strategies.

pr(job firm1) = pr(apl2 applies to firm 2) + 1/2(pr(apl2 applies to firm1)). (29)

Incoporating this equation in the equilibrium condition yields

$$w_1 * [(1/2)p + (1 - p)] = w_2 * [p + (1/2)(1 - p)].$$ (30)

FIGURE 7

Extensive Form of 2 Firms 2 Applicants Case

Pay-off player Sp1 $1/2w_2$ w_2 w_1 $1/2w_1$

Pay-off player Sp2 $1/2w_2$ w_1 w_2 $1/2w_1$

F2   F1   F2   F1

Sp2

F2   F1

Sp1

Source: Montgomery (1990)
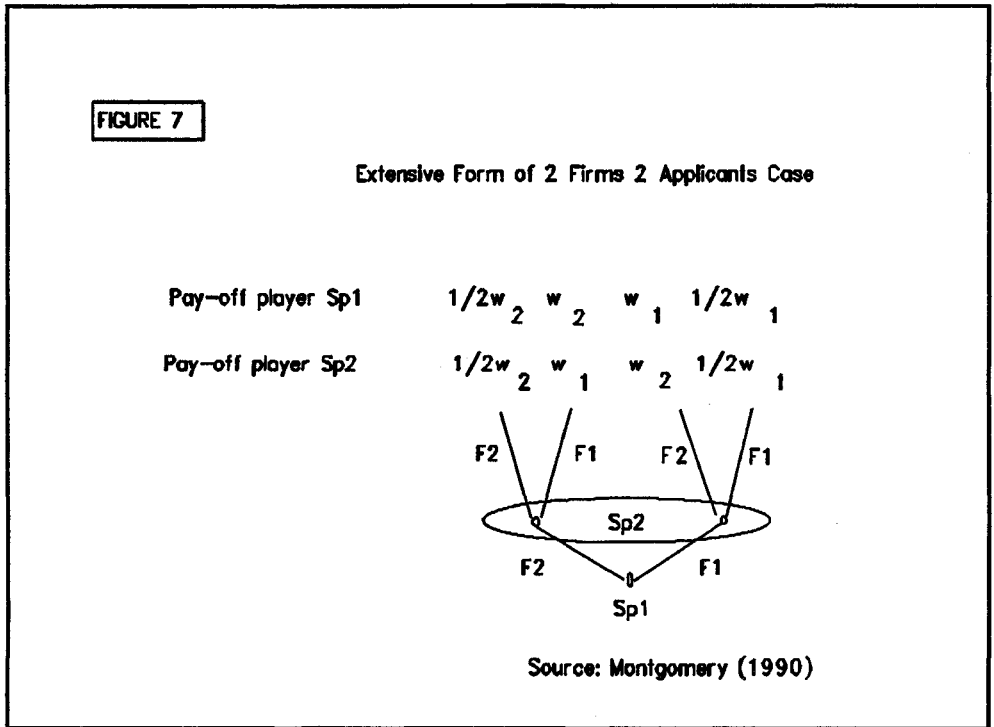
The solution for p gives

$$p = (2w_1 - w_2)/(w_1 + w_2).$$ (31)

with $\delta p/\delta w_1 > 0$, and $\delta(1-p)/\delta w_2 > 0$, which means firms can increase the probability that applicants apply to them by increasing their own wage offer.

We now switch to the firm's rationale of hiring workers. Firms are supposed to set their own wage in line with the principle of maximising expected profits and takes the other firms' wage offers as given. In this model each firm solves the profit maximising function of

$$\max_{w_i} (v_i - w_i) * pr(\text{firm i receives at least one applicant} | w)$$ (32)

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where w is the vector (w_1, w_2) for $i \in \{1,2\}$ and $(v_i - w_i)$ is the firm's premium payed for the job opening,.

The firm's premium results from the difference of the firm's own valuation of the job opening and the wage offered. Different firms may attach widely differing valuations at job openings. Firms with high valuation, i.e. those with either high capital-labor ratios, or those with temporary monopoly power in product markets will find vacancies particularly costly to them. For explanatory reasons Montgomery (1991) gives the example of a production technology where machines will sit idle if a vacancy is not filled. The urgency to fill vacancies will therefore vary widely between firms and hence the urgency premium they are willing to pay will vary accordingly.

When p_i is defined as the probability of a worker to apply to firm i the firms' objective functions are

$$(v_i - w_i) * [1 - (1 - p_i(w))^2]. \tag{33}$$

Substituting for p_1, firm 1 solves

$$\max_{w_1} (v_1 - w_1) * 3w_2 (2w_1 - w_2)/(w_1 + w_2)^2. \tag{34}$$

Following the solution provided by Montgomery (1991) the first order condition yields firm 1's reaction function. Firm 1 choses w_1 as a function of w_2 and and v_1.

$$R_1(w_2) = w_2 (w_2 + 4v_1)/(5w_2 + 2v_1) \tag{35}$$

Similarly for firm 2

$$R_2(w_1) = w_1 (w_1 + 4v_2)/(5w_1 + 2v_2). \tag{36}$$

Even when no solution for the equilibrium wage can be calculated, Montgomery (1991) points out that the nature of the functions allows only for one unique equilibrium. As mentioned earlier the model implies, that the firm which offers the higher premium will receive more applications, for $v_1 > v_2$ in equilibrium $p_1 > 1/2 > p_2$. In case of equal premiums between firms, that is for $v_1 = v_2$ in equilibrium $p_1 = p_2 = 1/2$.

The 2 x 2 case of the search-theoretic model makes three predictions which we can test later in the empirical analysis. First, firms with higher valuations of their vacancies will pay higher wages. Differences in wages offered by firms are a result of different industry characteristics as capital-labor ratios, monopoly power in product markets, unionization or other factors. Second, firms with higher valuations will have longer queues for their vacancies. Third, wages in this model

operate as strategic complements, meaning that an increase in firm 1's wage will encourage a wage increase in other firms, not only those with very similar valuation of vacancies.

The latter prediction is particularly interesting since it allows the applicability of the model when particular overall labor market situations occur, such as new minimum wage legislation, product-market shocks in an economy, or wage rises in one heavily unionised sector of the economy. If wages oerate as strategic complements wage rises in one sector of the economy will also lead to wage rises in other sectors of the economy. This generates a plausible and testable hypothesis on the backgound of the wage bargaining process by industrial sector in West Germany, where one industrial sector takes the lead in negotiating wage increases and other sectors then follow this wage signal. It also suggests that wage discrimination or segmented labor markets cannot be long lasting phenomena of the labor market.

2.8 A General Discussion of Labor Market Theories

So far we have mainly presented the "state of the art" of labor market theories since the early sixties without entering much in the discussion of these theories and approaches. Since these theories and approaches propose a number of alternative explanations of the same labor market phenomenon and, particularly, the relationship between education and wages at various stages of the life course we attempt, in a second section, to open a discussion on more general assumptions of the seven theories and approaches presented, and, secondly, extract very detailed hypothesis which allow to test the explanatory power of the theories and approaches outlined above. Of particular interest are hypotheses on the same real world phenomenon, where two theories would predict causal effects in opposite directions. Alternatively, we might be able to identify real world phenomena which can be explained by one theory but not by the other ones. A third possibility consists in identifying a theory which can explain, as good as other theories, our empirical findings and then discuss which one of the theories makes use of the least bridging assumptions or which one is based on more realistic assumptions.

The preceeding seven sections on labor market theories has been organized in a way to reconstruct the thirty five years old history of ideas in the field of labor market theory since the beginning of the neoclassical school in labor economics. The debate of human capital theory (Becker 1962) in the early sixties spurred a lot of criticism because of its preoccupation with the transfer of standard investment criteria to investment in human resources. The neoclassical theory of the economics of education asked the question to what extent is investment in human capital worthwhile. Based on the calculation of a rate of

return to human capital an investment decision can be taken to allocate resources to human capital following investment criteria in close analogy to investment in physical capital.

Some of the major shortcomings of the human capital theory are the rigid assumptions concerning the ability of individuals to have equal access to educational institutions and that those who succeed in their training efforts will have very similar returns on this investment. The issue of equality of opportunities in education, for example, is discarded to an issue of secondary importance as some kind of market imperfection. A similar rationale would be advanced to deal with differences in abilities when entering into the "process of investment" at the beginning of primary education.

Within stratification theory the status attainment approach (Duncan 1966, Duncan and Blau 1967) takes up these issues of equality of opportunities and differences in abilities. The occupational structure in a society is seen to be a major determination of mobility processes within a society. The dynamics of the occupational structure, and therefore occupational opportunities, largely determine processes of social mobility from one generation to the other or from the beginning of an occupational career over the duration of a person's occupational life course. What is "assumed away" in human capital theory becomes the major point of interest. The outcomes of different positions at the beginning of the stratification process are the declared major part of the research program. Education is seen as an intermediate variable in the process of transmission of status from parents to child at various stages of the descendent's occupational career.

Studying the process of stratification from the perspective of cohort analysis (Ryder 1965) adds a new dimension to the process of stratification, i.e. one which identifies a person as a member of a specific cohort. The role of generations is immediately obvious in stratification theory, but even within generations there are cohorts of persons with very specific common experiences which operate close to a personal characteristic in the stratification process. Specific historical events or specific combinations of environmental factors may lead to the formation of a rather unique cohort experience. Applying the cohort approach to the human capital theory could focus research on issues such as systematic overinvestment in education due to specific historical conditions such as an abundant endowment of parents with financial resources but high educational aspirations for their children. This could mean for some cohorts of entrants into the education system rates of returns considerations are of secondary importance. In this instance the prediction derived from straightforward human capital theory would be opposed to one based on the cohort approach applied to the human capital theory.

In contrast to the status attainment approach which starts from the basis of alternative assumptions to the human capital theory the cohort approach can be integrated to a large extent in the one or the other labor market theory with a

view to adding a more historical perspective toward the processes at work. In particular the desired "non-historical" approach of human capital theory might be softened by allowing cohort phenomena to influence the process of investment in human capital and future rates of return. There is indeed a possibility for an "economization" of social phenomena, a strategy to enlarge the applicability of abstract economic theory to explain broader social issues and processes as we shall discuss in more detail at a later stage in this section of the discussion of theoretical perspectives.

The idea to apply a cohort approach to the human capital theory touches on the broad discussion of rival schools of thoughts in the tradition of economics. This could be traced back to some economists of the late nineteenth century who reformulated the importance of historical considerations to study economic processes (the historical school or historicism). This school was in sharp contrast to the classical school in economics, or the neo-classical school of today, which attempts to establish economic laws comparable to laws in the natural sciences. [3] In this context our interest is simply to mention the usefulness to study economic laws against a changing background of specific historical circumstances. In other words, applying a cohort perspective to human capital theory is indirectly recognizing the use and relevance of historical knowledge for social study. A view which has had some influence on the so-called "Cambridge School" and their proposed return to political economy.[4]

Segmentation theories, as introduced in section 2.4, aim in a similar direction, i.e. to move away from the partial equilibrium models in labor market theory.

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[3] We are not interested in reviving the debate on the possibility and validity to deduce economic laws based on a small set of assumptions versus the more inductive approach of the historicists after the criticism and refutal of historicism as the approach has been named by Popper (1957). In his enlightning book on the poverty of historicism Popper describes as the very heart of the body of arguments which he calls historicism the view that "Social science is nothing but history" (Popper 1957 p.45). As much as I agree with his critical remarks on such a form of theoretical history I consider it useful to apply a method which I would call a historically embedded verification of social theory. The natural sciences are more or less capable to isolate certain intervening factors to ensure that an experiment could be repeated keeping these factors constant. In the social sciences we do not have this capability, but in making explicit the historical circumstances under which the empirical verification of theories has been carried out facilitates the possibility to "repeat" evidence for certain social theories. Social theory might be expressed in formal ways but in some instances working hypotheses with some minimum historical content might enhance our understanding of social processes when more formal theories remain to elusive for empirical verification.

[4] For a more detailed account of the Cambridge School of Economist and the various directions within this school of thought see Hutchinson (1981).

This move seems to be justified with reference to much empirical work mainly on the U.S. by Dickens and Katz (1986), Dunlop (1979), and Krueger and Summers (1988) who show that there are persistent deviations from the competitive equilibrium wage level of a whole economy according to industrial sector. Neoclassical economic theory and human capital theory within this tradition could only allow for temporary deviations from an economy-wide wage level for people with equal amounts of schooling or skills.

If the labor market would function as in the market clearing neoclassical view of markets workers mobility from badly-paying industries to industries with above average wages should equalize interindustry wage differentials in the medium or long run. Some persistent wage differentials may be due to compensation for undesirable features of hazardous working conditions on a job. In this view these interindustry differentials are to be understood as compensating wage differentials. Any wage differentials in excess of what could be understood as having a compensation component are interpreted in the neoclassical tradition as due to market imperfections. Theories of labor market segmentation as proposed by Stinchcombe (1978) consider these kinds of market imperfections as given and persistent over time.

Whereas the human capital theory and the status attainment approach both emphasize processes on the supply side of the labor market the segmented labor market theory looks at factors of demand for labor. Once certain industries have established a certain form of labor relations or the importance of an industry in terms of its share in general macro-economic growth has changed such factors might give rise to industry specific wages. Once such a wage differential has been created due to short-run demand factors they are very hard to change. Even after the original reasons for above average wages have disappeared in an industry such wage differentials are likely to remain. The highly institutionalized labor market of West Germany may indeed create a persistent structure of interindustry wage differentials which cannot be explained as a temporary or transitory phenomenon of the labor market.

Again seen against the background of the West German labor market in the post-war period it is unlikely that new cohorts of labor market entrants will eventually lead to an equalization of such wage differentials. In this respect the application of a cohort perspective on segmentation theories does not appear to improve on the explanatory power of these theories, probably due to the fact that segmentation theories contain already a large amount of historical content in the formulation of the theory which, of course, needs to filled with substance in each country it is applied to. This constitutes a basic difference of human capital theory and segmentation theories.

The remaining three and more recent additions to the repertoire of labor market theories are discussed jointly because of their shared feature of being to a large degree extentions or more refined theories of the labor market remaining

within the neoclassical tradition of rational behavior of agents. Screening and filter theories and the theory of job search assume no longer that agents in the labor market dispose of perfect information about firms and possible applicants. Although acknowledging this kind of market imperfection or defining that the process of selecting and acquiring information itself is not costless these theories assume that with these limitations agents in the labor market will reveal a maximazing behavior as is claimed to be true of all economic agents. Arrow (1973) and Montgomery (1991) make the attempt to bring in line economic labor market theories with what they claim is observable or more realistic economic behavior of labor market agents.

The search-theoretic approach and efficiency wage theories share another common feature. Both theories drop the assumption that the labor market will tend to come back to an equilibrium position with one equilibrium wage prevailing in the whole economy if enough time is allowed in which wages, after accounting for differences in investment in education, will be equal. The search-theoretic explanation proposed by Montgomery (1991) explains why interindustry wage differentials might be persistent even when a market equilibrium is reached, so that firms in industries which pay below average wages will no longer increase their wage offers to fill their vacancies faster. Similarly, efficiency wage theories claim that firms have an incentive to pay wages above average even if the market is in equilibrium in order to reduce shirking or labor turnover.

All three theories, screening and filter theories, efficiency theory and search theory, try to bring back more realism, more common experience, or perceptions of how the labor market functions into theories of the labor market. This attempt resembles in some way the approach we discussed above to apply a cohort perspective to the human capital theory. More real world assumptions, such as a persistent between industry wage distribution, frequently have some historical content to them something segmentation theories do not deny (Stinchcombe 1978). Search theory, for example, mentions reasons or offers a "story" how such a wage distribution might come about, but there is no indication which environmental factors or historical conditions might favor the creation of such an inter industry wage distribution. In other words search theory is still far from being able to explain the dynamics of the interindustry wage structure, particularly when this wage structure is changing albeit an industrial sector might no longer be recruiting for a number of years.

Efficiency wage theories are also to some extent charged with historical content if one considers the basic assumption of the Shapiro and Stiglitz model (1984) that workers can freely choose their level of work effort and consumption as only applicable under certain environmental and historical conditions such as prevailing democratic procedures. Screening models might also be enhanced in their explanatory power, for example, if the selection of filters largely depends on the size of a cohort willing to enter the labor market. Some working hypotheses

which are derived under such circumstances contain some historical content if the size of the cohort is due to changes in levels of fertility, or a change in the system of entry regulations for training programs. Working hypotheses of this kind endeavour to apply the filter and screening approach over time in a somehow historically embedded kind. In short, this means introducing a dynamic, in some instances a life-cycle perspective.

By introducing a medium or long term perspective most labor market theories and derived models will have to take account of some historical changes or historical events. Put differently, most of these theories still lack some dynamic features which frequently have to be guarded against by introducing more ad-hoc assumptions without touching basic assumptions.

With the exception of efficiency wage theories, economic theories of the labor market face the difficulty to remain limited in their explanatory scope, because they are partial equilibrium explanations of labor market phenomena. This deficiency originates largely in their preoccupation with microeconomic explanations when macroeconomic changes are kept within a ceteris paribus assumption, which, legitimately or not, assumes that these two levels are of a separable nature and macro-level effects are constant over time. Applying a cohort approach to micro-level labor market theories can therefore be regarded as allowing more maco-sociological or macro-economic effects to influence individual level behavior. Our previous argument in favor of historically embedded verifaction of labor market theories could be considered as introducing macro-sociological and macro-economic phenomena to have implications for micro-level individual behavior.

To come to a necessary preliminary end with this abstract treatment of labor market theories and to proceed to the more empirical part of the dissertation which will test more specifically the explanatory power of the theories we briefly sketch the argument which Schaefer (1989) named the economization of the social sciences through economic theory. Social phenoma which can easily be observed and have been documented in mainly sociological research or social psychology to be wide spread and persistent have found their way into the set of assumptions of economic theory with Akerlof, Lazear and Arrow being the main proponent of this school of thought.

In writing on the economy and society Max Weber (1972) already observed the widening rationalization of the "Lebenswelt" (lifeworld) as a continuing evolving process with the protestant work ethic being an important component in this development. Apparently, economic theorists are rapidly advancing in this direction. Thirty years after Becker's publication of human capital theory notions of this theory have found their way into the day-to-day work of human resource departments.

The empirical verification of the enlarged applicability of the neoclassical research paradigm cannot disprove ultimately the validity of these theories. However, collecting evidence which can no longer be explained within this research tradition might lead to what Thomas Kuhn (1957) called the eventual change of a paradigm if theories based on a widely accepted set of assumptions have increasing difficulties to explain and predict observable phenomena.

2.9 Generating Hypotheses

In this section we shall develop the four guiding research questions exposed in the introduction in order to derive more precise hypotheses which shall provide the structure of the following empirical part of the dissertation. Our primary concern is the application of a life course perspective towards the analysis of processes on the labor market. One of the principal hypothesis therefore is: on the labor market we observe life course patterns as a process which is to a large extent structured by institutions and society as a whole (Mayer 1987, Blossfeld 1989).

These structural patterns of the life course are usually charaterized by a high correlation of these patterns with age (Elder 1975, Kohli 1978, Müller 1978, Mayer 1986, Blossfeld 1989), or the duration of compulsory education, post-compulsory education, apprenticeships and work experience. As outlined, for example, in section 2.1 human capital theory contains some implicit assumptions about such a structure of the life course, that is usually full time education during the period of investment and a fixed or known life-time horizon, usually retirement age.

2.9.1 The life course perspective

In taking a life course perspective and applying it to the labor market we argue that at different stages during the life course, or just the occupational career, we observe intrinsically different processes of wage attainment. Therefore the omission of such a perspective will lead to biased results which cannot disentangle the processes at work. Taking the example of the human capital theory we argue that the process of entering in the labor market is very much different from the process of changing jobs during a later step in a person's occupational career. As a very simple structure of the life course concerning wage trajectories we propose to disaggregate the process of wage growth over the life course into three subprocesses.We differentiate processes (Blossfeld, Hannan, Schoemann 1989) involving wages at entry into the labor market, wage changes between jobs, and wage growth within jobs.

The life course perspective indicates that entry into the labor market is a special period or point in time when the transition from the education system to the labor market is realized. In this process of allocation of people to jobs we are interested to learn more about the role of education in this process and whether this role has changed over years. Several analyses have come to the conclusion that indeed there have been changes in the earnings of college graduates, mainly due to the rapid expansion of the education system (Freeman 1976, Helberger 1980, Blossfeld 1985).

In view of the life course perspective this transition period of entry into the labor market will allow us to derive hypotheses on the basis of each of the labor market theories outlined and discussed before. For the human capital theory this transition marks the beginning of the flow of earnings over the working life. As a kind of base-line measure this first earnings on the first job should indicate the relative position of a person's life-time earnings trajectory. Differences at first earnings are explained as a result of differences in investment education (Becker 1962).

Since other determinants of earnings trajectories are not yet relevant at the career entry we should find the highest percentage of variation in earnings which can be explained by differences in the level of education. Similarly the status attainment theory (Duncan 1966) would argue that the impact of father's education and occupational status transmitted via educational attainment of the child has the most immediate impact at entry into the labor market rather than at a later step during a person's occupational career (Soerensen 1985).

From the life course perspective we derive the hypothesis that particularly education will have its strongest impact on first wages on the first job and as the occupational career evolves, job changes occur for various reasons, the social structure might experience forces that contribute factors which will loosen the immediate impact of education on labor market events and earnings trajectories at later stages of the life course leaving scope to correct erroneous decisions during later stages of the life course.

Cohort analysis (Ryder 1965) argues that the shared time of entry creates a time uniqueness of these labor market entrants who subsequently will face very similar advantages or impediments for career advancement and wage attainment. This approach does not make a detailed prediction whether inequalities at the beginning of an occupational career will aggravate during consecutive stages but it is constructed on the importance to study the common point of departure of a cohort of labor market entrants.

Segmentation theories as developed by Doeringer and Piore (1971), or in the form as presented by Stinchcombe (1979), suppose that entering a specific labor market at the beginning of an occupational career has the immediate impact of lower earnings in disadvantaged segments of the labor market, but this will also have long lasting effects on earnings trajectories since they assume that there are

barriers between labor market segments which are very difficult to pass. Labor market entry into an industrial sector with secondary labor market characteristics will result in long lasting earnings differentials. The argument is that there are segments which feature a very different structure of the life course, so that changes between segments become almost insurmontable barriers. The analysis of the process of entry into the labor market is therefore a crucial issue in this process of sorting individuals into labor market segments. Segmentation theories in general envisage that the scope to correct erroneous decisions at entry into the labor market are very hard to correct during later stages of the life course, because labor market experience in one segment might become an indicator of a person's productivity, assuming that labor productivity is different in different labor market segments.

Screening and filter theories (Arrow 1973) are particularly clear in determining that the first evaluation of the true training content of educational certificates is made at the first job. However, a period of inspection of the skills or value of the educational certificate might lead to corrections of a worker's relative position in the wage distribution through slower or faster subsequent wage growth on the job. Screening theories view the hiring procedure as a process with limited information on both sides of the matching process, where certificates serve employers to sort out high productivity individuals. The way this sorting procedure is envisaged screening theories view the entry process as the first test of the value of credentials, a test which is repeated at later job changes.

Efficiency wages, in our view, put the least emphasis on the importance of entry conditions in the labor market. Some individuals will receive lower starting wages because they will have to build up a bond which is to be foregone in case of being caught shirking. Similarly search-theoretic approaches assume that the process of applying for a job is one which happens in an environment of uncertainty and, from an individual's point of view, mistakes due to a lack of information can be corrected in subsequent job search. Montgomery's approach (1991) equally is indifferent towards the importance of entry into the labor market. Vacancies with a higher valuation for the employer are less likely to be filled by new labor market entrants.

To evaluate this life course perspective of the labor market and the various theories we can no longer rely on empirical evidence based on cross-section data, nor do the so-called tracer studies (Kaiser,Nuthmann,Stegmann 1985), which focus specifically on the transition from the education system to the employment system, allow an adequate measurement of medium and long run effects. It is necessary to use very long employment and earnings histories of employees to capture long run effects. In particular issues of cumulative processes need to be observed over long employment histories (Featherman 1980, Mayer 1987).

The life course perspective tries to take account of this in that we analyze not only the question of (1) what determines the first wage at the first entry into the labor market but also (2) the role of labor market flexibilty that is, what determines wage changes when workers change jobs, which may be a job change within a firm or a change between firms (Blossfeld, Hannan, Schoemann 1989; Hannan, Blossfeld, Schoemann 1991). If workers join a firm in a disadvantaged labor market segment at the beginning of their career, in which they have no within firm career prospects, this will lead to cumulative effects if these workers do not manage to leave this labor market segment through job mobility between firms.

The third question which follows from the life course perspective is the analysis of (3) what factors influence wage growth on a job? Wage growth on a job, in particular if the duration of the job could be the entire working life, is an issue where so far very few attempts have been made to estimate such long run consequences of a decision which could have been the first time to accept a job. Only with such long run considerations we are able to differentiate jobs with good earnings prospects from those offering less wage growth or only short term contracts.

2.9.2 Time dependency and historically incorporated analysis

Time dependency of social processes is the second major area of interest of the dissertation. Most empirical work on labor market theories faces the difficulty that theories are formulated with much emphasis on the generality of processes and little concern for the specific historical circumstances of the process under investigation. Additionally, much empirical work had to rely on cross-section data and therefore could only address issues at one point in time. However, the increased availability of longitudinal data will allow to analyze long run processes which evolve in time (Mayer 1986,1987), and therefore it becomes more and more necessary to develop labor market theories with a more explicit reference to the location in time, if not a fairly explicit embeddedness in historical settings.

Our hypothesis concerning the time dependency of labor market theories is, that we propose to no longer view figure 1 on Mincer's operationalization of human capital theory in such a two-dimensional perspective. Moreover, this figure 1 needs to be seen against the background of figure 3 of the concept of time in social change. Our argument is that length of education as the duration of investment is different in different historical circumstances. Contrary to the standard neoclassical assumption of stable preferences there might be evidence for changing patterns of preferences for participation in higher education. Later birth cohort had better opportunities for such investment (Blossfeld 1985, 1989) and earnings trajectories of these later cohorts will be different. An individualized

view of the investment decision as the human capital theory proposes does neglect that such investment decisions are made within a social context of precise historical circumstances that influence individual preferences.

By filling the rather poor notion of time in human capital theory with historical details such as cohort size and cohort experiences we enter into the process of disentagling processes on the individual and societal level of analysis. As we described in the introduction we consider that both levels are contributing to the individual realization of earnings trajectories. Birth cohorts entering the labor market in the immediate post-war period had great difficulties to obtain higher education because reconstruction and a more urgent need to work in order to contribute to the household income were prevailing (Müller 1978, Mayer 1980) in most parts of Europe.

Time depencency of the dynamics of education and wage growth is also determined by structural aspects of the education system. Changes of the education system, as the large expansion of the education system during the sixties and seventies, are likely to have consequences on the contribution of education to achieve high earnings (Welch 1979, Helberger 1980, Blossfeld 1985). Later cohorts of school leavers are endowed with new skills and different knowledge which might have a higher valuation in the labor market than skills of previous cohorts.

Individual labor market experiences are subject to influences from other long run processes of modernization, such as a reduction of jobs in agriculture, or the at a certain time favorable macro-economic indicators. Hiring procedures of firms or industries might follow cyclical patterns in line with economic cycles. Periods of high unemployment might coincide with large cohorts of school leavers thus creating a special time dependency of the process of entry into the labor market.

2.9.3 Gender Issues

The theories outlined above make no special reference to gender issues. In claiming a generality of the theories beyond gender issues it is implicitly assumed that labor market behavior and the process of wage attainment are similar for both sexes. This assumption, that theories of the labor market and the process of wage attainment are valid for both sexes is, of course, an assumption which can be the subject of an empirical test. We shall carry out three analyses in the fourth chapter of the dissertation to test the generality of labor market theories to explain the wage attainment process of women and men at three different stages of the life course.

The application of the life course perspective and cohort analysis to the theories of male and female wage attainment is already introducing some additional historical content in relation to gender issues into hypotheses derived

from more general labor market theories. This is apparent in the process of wage attainment as subsequent birth cohorts enter the labor market (Mayer 1991). Later birth cohorts enter the labor market with a different level of skills. In some occupations even the same skill level has been acquired using new equipment as, for example, in secretarial qualifications and work using new and additional technical equipment. These learning achievements and technological innovations will lead to changes in earnings of later cohorts of women at entry into the labor market due to processes of innovation and modernization affecting both the supply of labor and the demand of labor.

For women we have witnessed substantial changes particularly on the supply side of the process. Perhaps the most dramatic change has occured in the participation of women in education which has led to an equalization of the time spent in education and the level of qualifications reached (Mayer 1980, Blossfeld 1985). Based on a general equilibrium framework, as neoclassical economics usually assumes, we should observe a narrowing of the wage differential between men and women due to the equalization of investment in education between the sexes (Becker 1962, Mincer 1974).

A second major change on the supply side of the process of wage attainment are the "additional years gained" by women as Imhof (1981) named the phenomenon that in the post war period women had fewer children and their children left the home earlier during their life compared to earlier birth cohorts. Taking these effects together women had gained a substantial number of years while being able to participate for longer durations in the labor force or re-enter faster into the labor market. We want to analyze this effect in more detail and in particular whether wages over long job durations have narrowed as more women show patterns of attachment to the labor force similar to men (Lauterbach 1991).

Much attention has been paid to the hypothesis that differences in wages between women and men are due to sex segregation, but there is very little research on questions like differential growth in wages over job durations. This is surprising since most theories like the human capital theory and the segmentation approach make assumptions about the wage attainment process over long durations. Human capital theory (Becker 1962, Mincer 1974), for example, considers the entire duration of the working life as the period to reap the returns of early investment. The perspective of statistical wage discrimination also hypothesizes that, because women are more likely to interrupt their working life, firms have an incentive not to recruit women into long run career track positions with high wage growth while being on the same job (Polachek 1981).

The theory of labor market segmentation makes also predictions about the duration of employment patterns with those in the preferential segments having both longer job durations and higher wage growth on the job. The gender issue is, however, seen as one specific dimension of the overriding process of labor market segmentation. This constitutes a hypothesis which needs to be addressed

in an empirical analysis. We shall attempt to disentangle the two processes of labor market segmentation and the segregation of women. Both process have the consequences to lock women into occupations and industries with lower initial wages and lower wage growth over job durations.

Only the comparison of women with men will indicate whether labor market segmentation is a phenomenon affecting only specific groups of labor force participants (Baron and Bielby 1984). Put differently, if we find labor market segmentation in the labor market of men during the post-war period and similar patterns of segmentation for women we have an indication that labor market segmentation is the process of overriding importance. For this reason it is advisable to begin with an analysis of labor market segmentation for men and then proceed to the analysis of wages of women.

In close connection with this issue of seperation of labor market segmentation and sex segregation is the issue of analyzing cumulative versus compensating effects. The segregation of women into specific occupation might work in addition to industrial segmentation so that women working in a disadvantaged industrial segment might also work in those occupations which offer lower wages which leads to an accumulation of wage disadvantages for women. On the other hand, it is possible to envisage that effects of segmentation and segregation will compensate each other so that even though both effects are at work we shall find no estimable effects of lower wages for women at specific points in their career.

The life course perspective opens up a further dimension of possible discrimination in the labor market. Labor market segmentation or segregation might occur at entry into the labor market but during later stages of the life course individuals might have possibilities to compensate these disadvantages experienced during earlier stages of the life course through job mobility into jobs with better wages (Bartel 1980, Borjas 1981). An analysis of these processes therefore needs to investigate whether such gainful job mobility exists and when this job mobility is most beneficial and most likely to occur (Carroll and Mayer 1986, Mayer and Carroll 1987, Mayer 1991).

We have already posed the three questions concerning the life course perspective. (1) How do individual characteristics and labor market segments affect wage rates of women and men at time of entry into the labor market? (2) How do they affect wage changes when women and men change jobs, either with the same employer or with a new employer. (3) What determines wage growth on a job for women and men? In addition to this set of three questions we are interesting in how these processes relate to each other.

Hypotheses based on labor market theories like human capital theory, status attainment theory, the screening approach, segmentation theories and efficiency wages have all in common that they emphasize the importance of the early process of labor market entry. Only the human capital theory implicitly assumes that through the competitive nature of the labor market women and men will

respond with job mobility to better paying employers if they are not payed in line with the marginal product of their labor. Segmentation theories view the chance to move away from jobs with low wages in secondary type segments (Doeringer and Piore 1971) as very limited. The segmentation approach and the view of the labor market as a segregated market both advance the hypothesis that cumulative processes are at work. Initial disadvantages at entry into the labor market can be seen as being reenforced as careers evolve (Thurow 1978, Lappe 1981, Blossfeld 1985). However, we found no particular hypothesis on gender related issues proposed by these theories that make predictions of how these three processes we differentiate relate to each other in a more detailed way.

2.9.4 Country Comparisons

The main hypothesis of this section is that the process of wage attainment taking a life course perspective reveals transsocietal structures which do not only apply to West Germany during the post-war years. The structure of the life course with respect to wage attainment which we have analyzed for West German men, and subsequently enlarged to enlighten the process of stratification of women, appears to be a valuable approach for male female comparisons. On the basis of these analyses we want to advance the hypothesis that the process of wage attainment and in particular the relationship of education and wages is not a specialized process which applies only to advanced market economies.

The hypothesis of the transferability of the perspective of the labor market developed in the previous sections to planned economies with a socialist political system is difficult to test with conventional methods (Wong 1990), that is one using a comparative-analytic approach. We no longer assume that the two systems are so different in their self-understanding and the way they organize the life course and structure careers that comparisons of the processes cannot yield meaningful results. It is our hypothesis that the difference between the process of wage attainment and life earnings between the two systems, once they are analysed in a historically incorporated framework, is one of degree rather than of predefined uncomparable categories.

McMichael (1990) describes the goal of incorporated comparisons as giving substance to a historical process through the comparison of its parts. Therefore, our hypothesis is that there is something like a whole, for example a process of wage attainment in a European labor market which has specific substantive features that are to be revealed through the historically incorporated comparison of its parts. "In short, comparison becomes the substance of the inquiry rather than its framework."(McMichael 1990 p.386)

Through the observation of longer career processes with a precise location in time and taking into account the interrelationship of macro-societal and economic factors as they structure individual level careers we set out to test whether incorporated comparisons yield additional insights into the processes at work beyond the traditional comparative-analytic approach. Using this historically incorporated approach we are interested in the possibility and advantages of this approach to develop historically-grounded social theory.

A second hypothesis in this respect is the importance to recognize time as one of the concepts that connect seemingly unrelated events and processes (Elias 1984) which allow us to differentiate processes which might occur at the same point in historical time but are also events in long run processes which might have quite different points of departure. We propose to view labor market phenomena not just as events and country comparisons as a timely coincidence but hypothesize that substantive processes differ in durations and structure so that focusing on singular events without this time perspective will lead to misinterpretations of results.

More precisely, the substantive hypotheses concerning the role education plays in the process of wage attainment are: (1) the increase in the size of the education system and higher educational attainment of later birth cohorts will lead to a comparative reduction in the earnings of those with more qualifications to those with lower level educational certificates independent of the level of organizing principles of society and economic development; (2) wages when entering the labor market, wage changes at job changes with and between employers, and wage growth over job durations are generalizable substantive features of the stratification process[5]; (3) Segmented labor markets are a phenomenon of industrialized countries independent of the level of industrialization and the institutional settings such as a planned versus a market type economy.

We now proceed to the empirical part of the analysis where we attempt to review the theories and hypotheses stated above in the light of our estimates of labor market processes. The analysis of West German men of the German Life History Study (Mayer and Brückner 1989) marks the beginning of the empirical part in order to identify the most suitable operationalization of processes and variables in a simple setting. In a second step we continue the empirical analysis in analyzing more complex structures of the life course as they are to be found

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[5] Evidence in support of this hypothesis has implications for the design of studies investigating the process of wage attainment in Germany after reunification since the analysis of long run processes of wage attainment over entire careers would necessitate information of processes of entering the labor market even if the date of entry falls within the existance of the former German Democratic Republic which has changed into a market-type economy.

in the leaving and re-entering of the labor force of women and the consequences for wage attainment. Finally, we investigate the structure of wages in a comparison of Polish men and West German men in the post-war years to test the possibilty to generalize our approach and results to advance in the direction of historically-grounded social and economic theory.

3. The Analysis of Life Histories of West German Men

3.1 Introduction

Occupational life histories and job-shift patterns of West German Men have already been the subject of analyses by Mayer and Müller (1972), Mayer (1979), Carroll and Mayer (1986), and Mayer and Carroll (1987). Our analysis in this chapter builds upon this work but shifts attention away from a focus on occupational status or class to labor earnings. This will allow us to discuss sociological and economic contributions to the analysis of life histories.

Studies of occupational careers have in recent years moved in two broad directions. One direction, the so-called new structuralism, emphasizes the role of the organization of labor markets, industries, and firms in shaping individual careers and rewards. One variant of structuralism holds that labor markets have become segmented into a "core" whose jobs convey high stability and high wages and a "periphery" whose jobs have inferior stability and wages (Averitt 1968; Gordon, Edwards and Reich 1982). Other approaches reject dualist notions yet insist that labor processes vary greatly across firms and industries in ways that affect outcomes to employees (Baron and Bielby 1984).

A second direction notes that inequality in earnings at a point in time appears to reflect age-related and experience-related processes. So attempts to understand the dynamics of inequality have explored patterns of life-course variations in wages and labor supply. Most empirical work on these issues has used cross-sectional data to estimate age-earnings profiles and wage growth (Mincer 1974; Atkinson 1975; Klanberg and Krupp 1981). Yet cross-sectional analysis cannot easily reveal the processes at work.

These two strands of theory and research have not yet been integrated effectively, not to mention more recent additions of labor market theories like efficiency wage models (see paragraph 2.6) or search-theoretic explanations (see paragraph 2.7). Analyses reported in this chapter try to do so by examining the effects of labor market segments on wage growth over the life cycle. This chapter deals with experiences of three cohorts of West German men in nonagricultural jobs using retrospective life-history data.

Our research strategy in this analysis for men is to disaggregate processes of wage growth over the life course into three subprocesses, involving wages at entry into the labor market, wage changes between jobs, and wage growth within jobs. We want to identify these processes and establish a methodology for its empirical verification. The focus of approach is on the three questions:
(1) What determines the wage at time of first entry into the labor market?
(2) What determines wage changes when workers change jobs, which may involve a job change within a firm or a change of firms?
(3) What factors influence wage growth on a job?

In analyzing these questions, we consider the interrelationship of individual characteristics, especially education and vocational training, characteristics of firms, and macroeconomic influences on labor markets. We develop more detailed hypotheses about the effects of these characteristics with reference to theoretical perspectives described in the previous chapter two and the more general hypotheses of section 2.9: (1) the human capital/status attainment approach, which emphasizes individual characteristics, (2) the screening/credentialling approach, which provides a structural interpretation of the effects of individual characteristics, and (3) the segmented labor market perspective, efficiency wage models and search-theoretic explanations, which assign causal importance to qualitative differences among firms, employees and labor markets. We discuss each approach in turn in the context of each subprocess with its specific hypotheses for men, below.

In order to answer our three questions, we analyze the employment histories of West German men from three birth cohorts in nonagricultural jobs. We begin our analysis by focusing on the experiences of men in order to keep the analysis simple. The comparison of outcomes for men and women and a country comparison of men are dealt with in chapter 5 introducing more complexity into the basic models.

We had to exclude agricultural jobs from our analysis, because the available data do not record payments "in kind" such as housing and board, which were common in agricultural jobs. This makes it difficult to compare levels of compensation with other kinds of jobs. The German Life History Study, directed by Karl Ulrich Mayer, conducted interviews with 1089 West German men from the birth cohorts 1929-31, 1939-41, and 1949-51 (Mayer and Brückner 1989).

3.2 The German Life History Data and Definition of Variables

The empirical analysis is based on the German Life History Study of the Max Planck Institute for Human Development and Education in Berlin (Mayer and Brückner 1989). 2,171 West Germans from the birth cohorts 1929-31, 1939-41 and 1949-51 were interviewed, representative with respect to certain social strata and the regional distribution within the Federal Republic of Germany. The data collection was carried out from October 1981 to May 1983.

With the aid of a standardized interview, it was the goal of the survey to register, with exact reference to time, the life course of these people concerning many aspects of the various life areas (social origin, education, occupation, family, housing etc.), and thus, to create a data set suitable for dynamic analysis. Of particular interest for our analysis is the information collected for each job spell on monthly net starting and net finishing wages in a person's occupational career. Respondents were asked direct questions in the interview. On the basis of

the data on hours worked on that job, hourly wage rates were calculated and deflated by the retail price index. Since data on earnings of farm workers, especially in the immediate post-war period included a large amount of payments in kind we shall exclude these job spells from the analysis.

So far we have not mentioned problems which exist to arrive at a theoretically satisfying and operational definition of earnings, income or wealth. Should we focus on the distribution among individuals, families or households? Should we consider monthly, annual, or life-cycle earnings? Desirable, but usually unavailable, is information on pre-tax income and disposable income e.g. the money that remains in the pockets of consumers after redistributional schemes have been applied and taxes paid. However, this is only part of the complexity involved in the analysis of income data. For some employees, firms, or institutions have special pension schemes, which are obviously part of lifetime income. Then there are various kinds of fringe benefits which can be given to employees to top up their monthly salary, for example company cars, cheaper shopping of firm products, company gifts and so on. It is well known that inheritance plays a major role in a person's spending power, but so do capital gains(losses) from investments. An analysis of earnings data faces the difficulty that it has to make decisions whether such capital gains of investments out of earnings or capital gains on inherited wealth is part of a person's monthly income.

An additional complication arises if we evaluate the spending power of earned income. Regional variations in the level of inflation and even inflation rates of baskets of goods bought by pensioners compared to the one bought by groups of society which are more mobile and can shop around vary. Therefore $1000 for one person is not necessarily equal to $1000 to another person in terms of spending power. These issues have to be kept in mind if we use data of earnings and income. Various forms of earnings in kind like imputed rent or production for home comsumption increase difficulties of precisely measuring earnings. At this point we only want to point out some of the difficulties which have to be faced in this field of research.

We make use of retrospective life histories. This means, persons interviewed were asked to reconstruct their life course with exact reference to time. Recollection errors are of course the more likely, the longer the time between the interview and the occurrence of the event. However, there are few methodological studies concerning the reliability of retrospective data. General reservations with regard to the inaccuracy of such data are thus plausible and yet they have not been empirically demonstrated.

Retrospective earnings data are frequently expected to be subject to some particular problems of reliability, but the only systematic analysis of this issue was carried out by Ferber and Birnbaum (1979). They tested the validity of reported earnings of all female clerical employees in the Coleman and Rossi Retrospective Life History Survey in a comparison with the annually published

report of the earnings of these clerical workers. They conclude, "we have also seen that the distribution of deviations is not significantly different for current and past data. These results do not show that retrospective data are entirely accurate, and may be interpreted rather to show that self-reported data are somewhat unreliable whether for past or present. Nevertheless, our study suggests that, as long as self-reported data are to be used, retrospective information on earnings could be a useful alternative to the far costlier and more time-consuming panel operation."

Despite possible difficulties with earnings data information on education and vocational training, as well as on a person's occupational history are very reliable as has been demonstrated by Blossfeld (1987a). With this data set we have at our disposal detailed longitudinal data including earnings, educational and occupational careers of three birth cohorts. Appendix one is proposing an alternative way to analyze the question of reliability of retrospective data.

The human capital theory stresses the importance of general education as determinant of the first wage and subsequent wage growth. To capture both the hierarchical structure of the general education system and occupational qualifications obtained through the vocational training system, we use a combination of general and vocational qualifications of employees at the time of entry into a job. Qualifications are classified according to the average number of years of schooling required to obtain a certificate (see Helberger 1983; Huebler 1988, Mincer 1974): a lower secondary school degree without vocational training = 9 years; a lower secondary school degree with vocational training = 11 years; an intermediate school certificate without vocational training = 10 years; an intermediate school certificate with vocational training = 12 years; an upper secondary school certificate ("Abitur") = 13 years; a qualification as master, craftsman, or technician = 15 years; a degree from a college of engineering or a professional college = 17 years; a university degree = 19 years. Prior attempts and difficulties of interpretation using a dummy coding of educational levels are documented in Blossfeld, Hannan, Schoemann (1988).

Work experience is measured by two separate indicators. One is the length of time spent as a member of the labor force, which captures general work experience, the other one is the duration of a job spell, or the current job, which gives a measure of job-specific human capital acquired on-the-job.

The life-cycle dependency of an individual's earnings history is accounted for by including age as an independent variable, and a dummy variable coded 1 if the previous job was the first job, and another dummy indicating whether the current job is the first one, or not.

Records on individual job change, or any change in activity, as the smallest unit of an occupational career, and additional information about employees, allows not only to distinguish between inter- and intra-firm changes, but also a differentiation according to demand side indicators and job requirements. We

recur to an operationalization which has been applied in tests of segmented labor market theories and the theory of internal labor markets (Blossfeld/Mayer 1988). The assumption is, that the probability for the existence of an internal labor market increases with the size of the firm. Similarly we expect, that the higher the qualificational requirements of a job, the higher is the probability, that the job is in the primary segment of the economy. If we dichotomize these two dimensions, according to the dual and internal labor market theory we can extract four labor market segments along the lines of a typology based on Lutz and Sengenberger (1974): (1) internal labor market: skilled jobs in large firms, (2) craft jobs: skilled jobs in small firms, (3) mass production jobs: unskilled jobs in large firms, and (4) peripheral jobs: unskilled jobs in small firms. We implement this conceptualization using three dummy variables, size, skill, and their interaction.

Job changes in the German Life Course Study were coded on the basis of the international system of the classification of occupations (ISCO). We coded jobs in terms of qualification standards using a system that has already proved useful in several empirical labor market studies (Blossfeld 1985, Carroll and Mayer 1986. Blossfeld and Mayer 1988), distinguishing between unskilled, skilled, and highly skilled activities in the areas of production, administration, and services. The dichotomy of low and high qualification standards in jobs results from classifying all unskilled activities in production, administration and in the services as jobs with low qualification standards. The classification of all other skilled and highly skilled activities fit the category of jobs with high qualification standards. Previous experience using this classification shows that the resulting category of "jobs with low qualification standards" includes all those activities which, according to the theory of a segmented labor market, belong to the secondary segment.[1]

The ensuing distinction between jobs with high qualification standards in large and small firms takes into account the fact that the Federal Republic of Germany has a highly developed system of vocational training, the dual system, in which, crafts and qualifications are acquired that can be used in a number of small firms while in large firms these qualifications tend to be firm specific. However, the separation of jobs with low and high qualification standards in large firms also allows for the distinction between primary and secondary jobs within large organizational structures (Blossfeld/Mayer 1988).

Carroll and Mayer (1986) and Mayer and Carroll (1987) follow Stinchcombe (1979) and defined industrial sectors using a cross-classification of two dimensions. The first distinguishes product markets where entry is restricted (by licenses, technical restraints, or state monopolies) from open, competitive markets. The second distinguishes industries according to whether they rely on unskilled

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[1] In all these segments we have a distribution of about two thirds men and one third of women considering the whole sample.

labor, skilled labor, or whether positions are tied to property rights. Carroll and Mayer defined seven industrial sectors: (1) traditional primary industries such as fishing and forestry (competitive, labor tied to property rights), (2) small competitive industries such as retail trade (competitive, unskilled labor), (3) classical capitalist firms in commodity markets such as textiles and food processing (competitive, unskilled labor), (4) competitive industries such as construction (competitive, skilled labor), (5) large-scale engineering-based industries such as chemicals and machine tools (technical restrictions on entry, skilled), (6) professional service industries such as education and health (restriction by licensing, skilled), and (7) bureaucratic service industries such as government and banking (state restrictions, skilled). We use Carroll and Mayer's (1986) coding of more refined industrial categories into these seven sectors. When using this scheme in our analysis, we enter six dummy variables with the classic capitalist sector as the excluded reference category.[2] For an in depth explanation of the classification scheme please see under paragraph 2.4 and Figure 4.

In addition to labor market segments we distinguish between jobs in the private sector and the public sector using a dummy variable to account for a differential development of wage growth in these two sectors of the economy.

In order to take account of changing macroeconomic circumstances we used annual data on the aggregate national unemployment rate and yearly growth rates in gross national product. We associate with each spell the levels of these conditions in the year in which the job began. These macro-level time series may give some indications whether effects of aggregate unemployment on individual micro-level earnings are present as the efficiency wage theory predicts.

In order to adjust for possible secular trends or vintage effects in earnings we also add the historical time of the beginning of a job, measured in years since 1950, to the models. In some prior analyses we used dummy variables to distinguish the three birth cohorts of the Life History Data. Since they did not

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[2] The survey response codes of the German life history study and their regrouping into the industry schema our as follows: traditional primary industries (agriculture, forestry, fishing, animal husbandry;1), small competitive industries (sales, retail, hotels, restaurants, personal hygiene, hairdresser;11,14,15,19), classical capitalist industries (printing, leather, textiles, clothes, food, wood, paper;8,9), competitive craft industries (electrotecnical, metals, mechanics, optics, musical and sport instruments, toys and jewellery, construction;7,10), large-scale engineering industries energy, water, mining, public utilities, chemicals, oil, stones, earth, glass, rubber and asbestos, iron, steel, non-ferrous metals, machinery, automobiles, steel construction, office machines, communications, transportation;2,3,4,5,6,12), professional service industries (health, science, education, arts, press, churches, associations, private households;16,17,18,20), bureaucratic service industries (banking, insurance, state offices, defense, social insurance;13,21).

have sizable or significant effects, we then excluded them from analyses documented here.

3.3 Starting Wages in First Jobs

We begin our analysis with the determinants of wage rates at entry into first jobs. Our main goal in this first analysis for men is to establish a baseline against which to compare findings from analyses on the second and third research questions, i.e. wage changes at job changes, and wage growth over job durations. We shall mention in what follows some major hypotheses concerning maily men derived from the theories outlined in chapter 2. This shall be done with a focus on their contribution to explain the wage distribution of men with their more uniform patterns of attachment ot the labor force (Mayer et al. 1990) at entry into the labor market.

Numerous sociological and economic theories emphasize the role of formal education in determining wage rates. Sociologists working in the status attainment tradition, beginning with Blau and Duncan (1967) and Duncan, Featherman, and Duncan (1972) report that years of schooling has a powerful effect on first wages. In a later study, Featherman and Hauser (1978) find that the effect of education in the United States had increased over a decade. Researchers in this tradition attribute the increasing strength of the effect of education to the growing rationalization of society which heightens the importance of acquired statuses, especially those conveyed by participation in formal organizations like schools, vocational training, or universities. Additionally, one could argue that this growing rationalization of society affects first of all the occupational careers of men and subsequently spreads out to include more and more women into this process of rationalization of the life-world.

Many economists agree that education has come to dominate the process of wage attainment at entry into the labor market, although they might disagree on the reasons why this occurs. Human capital theory, in its original form developed by Becker (1964) and Mincer (1974), holds that wage differentials reflect differences in educational investment (and various forms of on-the-job training, which will be of interest in the analysis of wage changes and job change and wage growth while staying with the same firm. Costs of education in form of both direct costs and costs in form of foregone earnings are considered to be an investment which pays off over the whole working life. Investment in education increases wage rates because education increases generalized knowledge and skills which make a worker more productive in any job.

Theories of filtering (Arrow 1973) and signalling (Spence 1974) hold that certificates acquired in formal education serve as a signal which allows an employer to infer on differences in real productivity among applicants. Schooling

is considered to be important more for the signal it conveys rather than for the competencies it instills. The first test for the value of the education certificate is the earnings obtained at the beginning of the first job.

Thurow's (1975) model of job competition builds on this notion. It assumes that characteristics of a job determine the productivity of incumbents and relevant skills are acquired on the job. In searching for a job applicants compete for the opportunity to acquire training (the employer's cost of training) rather than for wage rates. Employers prefer applicants whose training costs are low but employers have no means to observe these costs directly. Instead employers rely, as a kind of substitute, on educational credentials as signals of trainability rather than of pre-existing productivity.

We are especially interested in the dynamics of education and wages, notably whether returns to education have changed over time. Suppose that education affects wage rates only by conveying productive skills and that the content of schooling does not change greatly over time. Then the returns to education ought to be stable over time. But, if the link between schooling and wage rates reflects mainly processes of formalization of requirements and general processes of rationalization, then presumably the returns to education grow stronger over time as norms of rationality strengthen. If, on the other hand, schooling is a "positional good" that serves only to rank candidates rather than to indicate productive capacities, then the returns to education will decline over time when, as is the case in West Germany, the educational system expands and average levels of schooling increase. When the flow of graduates with advanced degrees exceeds flow of vacant positions that require such training, the returns to a particular level of schooling decline. As noted above, some American studies have shown that the effect of education on earnings increased from the early 1960s to the early 1970s. On the other hand, recent studies of West Germany using cross-sectional data from the census and micro-census suggest that expansion of the education system may have depressed the rate of return to education (Helberger 1980; Weisshuhn and Clement 1982), especially for persons starting their first job (Blossfeld 1985; 1987b). Our research provides an opportunity to learn whether the experiences of the three cohorts, entering the labor market at different historical times, also reveals that the returns to education have changed over time.

Trends in returns to education may be masked by the trend toward sharply higher beginning wages over the post-war period (Göbel 1983). So-called "vintage models" (Rosen 1976) hold that such increases are due to upgrading in the general level of education that permits employers to adopt technologies that increase overall productivity and raise wages.

The perspectives considered so far treat the labor market as a single entity. Other perspectives argue that labor market processes are characterized by segmentation into a number of seperate labor market segments. According to Doeringer and Piore (1971) and Gordon, Edwards, and Reich (1982) larger firms

in the "core" of the economy can offer lower starting wages to new labor market entrants because they offer the possibility of steeper career trajectories and higher wage growth. Other analysts argue that the possibility of on-the-job training also affects starting wage rates (Hashimoto 1981). When general, transferable skills can be acquired on a job, a worker can leave the firm without losing the advantages conveyed by such skills. Because the firm loses the returns on such investments when a worker quits, firms will demand that workers contribute to the costs of investments in generalized human capital by accepting lower starting wages. On the other hand, when employment provides only (or mainly) firm-specific skills, which have no value in other firms, the firm will be prepared to pay the usual wage rates.

The search-theoretic approach (Montgomery 1991) does not differentiate further into a wage distribution by industrial sector according to particular hiring practices for men at entry into the labor market. In the view of search theory it is the search strategies of men which might be different from women which could create a different wage distribution for men than for women at entry into the labor market. However, there is little evidence to hypothesize that men entering the labor market have a geographically larger search horizon than women. For our base-line analysis in this chapter we cannot argue that certain men would have different search strategies. In Montgomery's model of the inter-industry wage distribution it is the urgency of employers to fill vacancies quickly that eventually creates differences in earnings by industrial sectors. It remains unclear why industries would pay wage premiums to job applicants at entry into their career rather than at later stages during the occupational career.

Macroeconomic conditions, as non-normative conditions (Mayer 1987) at the time of labor market entry may also affect first wages (Blossfeld 1987). The neoclassical perspective on labor markets assumes that wages are flexible and rise or fall according to fluctuations in supply and demand. If so, worsening macroeconomic circumstances depress starting wages by reducing the demand for labor. Theories of segmented labor markets suggest that wages in the secondary segment are especially sensitive to macroeconomic conditions such as changes in the gross national product or in national unemployment figures. (Dickens and Lang 1985; Shapiro and Stiglitz 1984). Due to institutional effects and specific regulations for pay increases and job security this external labor market pressure on wages might be subdued with particular strength by new labor market entrants as they enter as a new cohort into the labor market.

Model

The German Life History Study records after-tax earnings in the first and last months of a job. Unfortunately the data do not provide detailed information on hours of work at the beginning and ends of jobs but only average weekly hours

of work on the job. In order to approximate a starting wage rate, we divided starting monthly earnings on a man's first job by four times average weekly hours. We converted the wage rates into real terms, deflating them by the price index found in Statistisches Bundesamt (1989).[3] Observed wage rates are non-negative. The distribution of labor earnings is often skewed to the left. Therefore it is usual to use log-linear models in analyzing the determinants of wage rates. We follow this convention.

Of the total sample of 2171 persons we have 1089 men (and 1082 women) in the total sample. After excluding those persons who never had a job 964 men (and 919 women) had first jobs outside of agriculture. Starting wages are observed for 782 men (and 729 women) of these cases. Inspection of the data suggests that missing data might not be random. The probability that a wage is observed is higher in recent job spells, and for first jobs in the public sector. The sample of first jobs of men with observed wages could be subject to sample-selection bias. We deal with this problem using the instrumental variable (IV) estimator proposed by Heckman (1978) and Heckman and Robb (1985). We use the full 964 cases of men (and 919 cases of women)to estimate the probability of inclusion in the sample with observed wages, using probit analysis. Then we include the predicted probability of inclusion as a covariate in estimating models of the determinants of first wages using the 782 cases for men (and 729 cases for women) with observed wages and the IV estimator. That is, we apply OLS to models of the form:

$$\ln W_0 = \beta'x + \tau p + e, \qquad (1)$$

where W_0 is the starting wage on the first job, x is a vector of covariates evaluated at time of entry, p is the estimated probability of inclusion in the sample, and e is a disturbance term assumed to be uncorrelated with the covariates (conditional on p).

Findings

Table 1 reports estimates of two models. The first, in column (1) contains the core set of variables describing individual and macroeconomic characteristics along with four dummy variables describing labor market segment: size, skill level, the interaction of size and skill, and public employment. Column 2 adds six dummy variables that distinguish industrial sectors as defined by Carroll and Mayer (1986).

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[3] This price series begins in 1950. Because it is difficult if not impossible to establish a consistent price series between 1945 and 1950, we use the 1950 deflator for all wages observed before 1950.

Both the main effect of education and the interaction of education and trend differ significantly from zero at the .05 level. As each perspective reviewed above holds, education has had powerful effects on starting wages. The main effect (0.111) tells the effect of an additional year of schooling or vocational training on the log of the wage rate in 1950 (since the trend is scaled to equal zero in 1950). According to this estimate, the average wage at the maximum level of education (19 years) was three times higher than that at the minimum level of education (9 years) in 1950.

Table 1: Estimates of Log-Linear Models of Determinants of First Wage Rates (Standard Errors in Parentheses)

Independent variables	Model 1		Model 2	
Intercept	−1.74	(.909)	−2.14*	(.900)
Individual characteristics				
Education (years)	.111**	(.027)	.109**	(.026)
Education * trend	−.003*	(.001)	−.003*	(.001)
Labor market segments				
Public	.158	(.100)	.221	(.117)
Large Firm	.087	(.129)	.050	(.128)
Skilled job	−.093	(.108)	−.095	(.106)
Large * skilled	.213	(.149)	.181	(.147)
Primary industries			−2.36**	(.737)
Small competitive industries			.028	(.104)
Competitive craft industries			.375**	(.087)
Engeneering-based industries			.326**	(.084)
Professional service industries			.118	(.157)
Bureaucratic service industries			.131	(.128)
Aggregate conditions				
Trend (in years since 1950)	.076**	(.016)	.072**	(.016)
Unemployment rate	.004	(.005)	.003	(.005)
% change in GNP	.009	(.010)	.009	(.010)
Probability of inclusion				
λ	1.74	(1.06)	2.04	(1.04)
Number of cases	782		782	
R²	.29		.33	
Mean of dependent variable	1.52		1.52	

* p < .05; ** p < .01.

The significant negative interaction of education and trend speaks to changes in the returns to education. It means that wage differentials between workers with little and much education have narrowed. According to this estimate, the ratio of the average wage at 19 years of education to that at 9 years of education had fallen from 3 in 1950 to 1.4 in 1975, net of trend and other covariates. In other words, the relative starting wage advantage of those with university degrees relative to those with minimal schooling was cut in half over the period from 1950 to 1975.

The design of the life history survey, which includes birth cohorts rather than cohorts of labor market entrants, creates a correlation between level of education and time of entry into first job. For example, by the late 1970s when German economic growth had slowed considerably, the only people from these cohorts who were still entering first jobs were those with degrees from a university or a polytechnic. In order to learn whether such a correlation might affect our findings, we replaced the interaction in column 1 with spline-function interactions that shift at 1975. That is, we allow the slope of the effect of the education-trend interactions to change in 1975. However, this alteration does not change the substantive conclusions reported above. These results are discussed in more detail in Blossfeld, Hannan, Schömann (1988).

Next consider the estimated effect of labor market segment, as measured by size of employer, skill level of the job, and the interaction of the two (Blossfeld and Mayer's (1988) approach). None of these effects differs significantly from zero. The effect of public employment is positive, but it is also insignificant.

The (log-linear) time trend is positive and significant. Starting real wage rates have risen over time, consistent with the view that technological changes and increasing levels of education have shifted wage rates upward. These findings agree with those of Welch (1979) and Blossfeld (1985) based on cross-sectional analysis of population census and micro census data. Surprisingly, year to year fluctuations in macroeconomic conditions do not have significant effects on starting wages.

These results for the time trend support the vintage models first proposed by Rosen (1976). Because of the high correlation of duration of education and years of age at entry into the labor market we are not able to separate the age effect precisely and the dummy variables on birth cohorts were also insignificant in previous analyses. Therefore we identify vintage effects as one of the major factor of social change over time in the model of starting wages on first jobs. Rising starting wages in first jobs were reaping some of the benefits of more general productivity increases in the economy and probably teaching methods and/or improved content of courses (compare section 2.3 on cohort analysis and vintage effects).

Both the size and the significance of time trend in this model suggest that in longitudinal analysis of long durations it is important to capture cohort and vintage effects in some form or the other, because otherwise estimated coefficients are likely to be biased due to these macro-effects on individual level earnings. For men we find no significant effects of the macro-economic variables such as the percentage change in gross national product nor the unemployment rate. This indicates that either the macro-economic indicators we use are not significant or that macro-sociological or societal changes such as the process of modernization not captured in gross national product are more important to explain this phenomenon.

Column 2 adds Carroll and Mayer's (1986) specification of industrial labor markets to the model in column 1. This addition improves the fit significantly at the .01 level. Relative to the reference category of classical capitalist commodity production, the primary sector has significantly lower wages and the competitive craft-based and engineering-based sectors have significantly higher starting wages, net of the effects of education and other covariates.

The recently developed search-theoretic explanation of wage differentials between industries (Montgomery 1991) can also explain these findings of significant effects of industrial sector on labor earnings. The well paying large-scale engineering-based industries and competitive craft industries incur higher costs if their capital intensive machinery is resting idle. Hence, these industries are willing to pay higher wages to fill vacancies quickly. However, it remains unclear why these industries pay higher wages already to unexperienced workers who have little or no prior work experience to operate machines. Since these new labor market entrants can only be effective machine operators after some period of initiation the argument to pay higher wages in industries where expensive machinery would otherwise be idle remains an unconvincing explanation of the empirical finding of an inter-industry wage distribution.

It is worth noting that adding the effects of industrial sectors does not alter conclusions about the effect of education and about the decline in returns to education over the period. These effects are virtually the same as those reported in Table 1 column 1 indicating the use of a relatively robust basic model.

Finally, the coefficient of the probability of inclusion is positive in both columns of Table 1. This result suggests that higher wage rates were more likely to be recalled, as suggested above. Factors influencing recall are education and public sector employment. The probabilty of inclusion in this analysis of first wages of men at entry into the labor market is not a significant coefficient. For more details on the impact of recall errors on estimation results we refer to the appendix where we discuss in detail the impact of recall errors on coefficients of the regression of earnings functions.

3.4 Effects of Job Changes on Wage Rates

Now we turn attention to *wage gains from changing jobs*. Rather than considering levels of wage rates, as in the analysis above, we focus our attention in this part on the relative size of starting wages on a new job to ending wages on the previous job. We analyze wage changes separately at two kinds of events: job changes within a firm and changes between employers.

Consider the possible effects of education on the gains to the two kinds of changes. If education serves mainly as a signal in labor markets, its impact on the gains from the two kinds of moves should be quite different. In the case of moves within firms, employers have direct information on employees and have less need to rely on indirect signals of competence and productivity. So education should not affect the gains in wages due to changes in jobs within firms. But the signal is potentially useful to employers in other firms who lack direct evidence. So education ought to affect the wage gains involved in changing employers, as it affected first wages.

On the other hand, if education represents generalized skills that have value to any employer (as human capital theorists hold), the impact of education on relative wages should not differ for the two cases. Persons with higher education should gain equally from moves within and between firms.

According to the theory of internal labor markets, it matters whether a job change occurs in an internal or external labor market. Internal labor markets have relatively fixed ports of entry and rigid career paths with institutionalized growth in wages. Advancement into higher positions is governed by seniority and firm-specific work experience. Knowledge of such careers operates as an important instrument of motivation and control (Akerlof 1982; Rosen 1982; O'Keeffe, Viscusi, and Zeckhauser 1984). In such fixed career paths, wage rates are allocated to positions in a manner that rationalizes a career and depend little, if at all, on the qualities of workers who fill the positions.

Since persons who enter the labor force for the first time are uncertain about their abilities, skills, and attainable wages (Viscusi 1983), the rate of job change is high early in the career (Tuma 1975) and has the biggest payoff in terms of wage gains. In particular, we expect that moves out of first jobs will accrue higher than average wage gains.

Human capital theory predicts that frequent job change depresses growth in wages, because a short duration in a job gives little chance of acquiring skills through on-the-job training (Borjas 1981; Bartel and Borjas 1981). Bartel's (1980) analysis of the Coleman-Rossi retrospective life history of American men finds support for this hypothesis: more mobile workers have smaller on-the-job wage gains than workers who stay with the same job. However, she finds that mobile workers had larger earnings growth because their smaller earnings growth within jobs was more than offset by higher increases when they moved between firms.

Borjas's (1981) analysis of data from the National Longitudinal Surveys also finds that individuals who had changed jobs had lower earnings gains than those who stayed with the same firm. Unlike Bartel, Borjas finds that the short-run wage gains due to job mobility do not pay off in the long run. Individuals with longer job duration have higher total wage growth than individuals who have changed jobs during their career.

Several perspectives suggest that durations of non-employment, either unemployment or absence from the labor force, affect wage growth. Human capital theory predicts that generalized and specific human capital depreciate during spells of non-employment (Mincer 1974). Search-theoretic approaches recognize a positive value in such interruptions between jobs if they are actually used for intensive job search (Montgomery 1991, McKenna 1985).

The theory of segmented labor markets predicts that wage growth is only associated with job change for those in the primary segment (Dickens and Lang 1985). Workers in the secondary segment, where involuntarily job changes are frequent, rarely gain in wages when they change jobs. Empirical tests of this hypothesis from several countries have yielded mixed results (Ryan 1980; McNabb and Psacharopoulos 1981; Neuman and Ziderman 1986).

The search-theoretic approach would suggest that firms in industries which are capital intensive will offer higher wages if they have a vacancy to fill this vacancy quickly. This suggests that workers leaving labor intensive industries could benefit in terms of wage gains when changing between employers and industrial sector. Within firm changes of a job are a suitable way to fill a vacancy quickly and should be associated with wage increases.

The rankings of wages by industry show a fairly stable pattern in West Germany over the recent period (Weigend 1982). The only remarkable wage increases are at the beginning of the seventies for employees of regional government authorities, which reflects efforts to equalize wages in the public and private sectors in order to attract more highly qualified people into the public sector at a time when government services were expanding (Weigend 1982). Indeed, the number of highly qualified jobs increased much faster in the public sector than in the private sector (Blossfeld 1984). Therefore we expect that movement to the public sector will produce above average wage gains.

Model

Analysis of determinants of wage changes at time of job change is obviously conditional on the event that a person changed jobs. We do not ask why a person changed jobs here, but consider how individual and labor market characteristics affect the wage gains from changing jobs. A case in this analysis is a person's job change. Persons who have changed jobs frequently therefore contribute more observations than those who changes jobs only once during the observed period, while those who never changed jobs will contribute no cases for this analysis. The fact that those who changed jobs frequently will contribute more cases does not introduce a bias because other job characteristics and personal attributes like the level of education might have changed between the two jobs. To reconstruct complete wage trajectories over the life-cycle we would need information on the determinants of the probability to change jobs.

The dependent variable in the regression analysis presented in Table 2 is the logarithm of the ratio of the starting wage rate in job n+1 (W_{n+1}) to the finishing wage rate on the previous job (W_n). Only 390 of the 702 observed job changes within firms for men (136 of 284 for women) have data on both components of the ratio. But in the case of transitions between firms, 1439 of 1852 cases for men (900 of 1076 for women) have an observed wage ratio. As in the analysis of the determinants of first wages we estimated the probability of inclusion in the sample with observed wages as a function of the covariates and included the predicted probability as a regressor in analyzing the determinants of wage gains.[4] That is, we applied OLS to models of the form:

$$\ln (W_{n+1}/W_n) = \text{ß'}x + \tau p + u, \qquad (2)$$

where x is a vector of covariates that contains characteristics of the individual and of the two jobs involved, p is the estimated probability that both wages were reported, and u is the disturbance (assumed to be well-behaved conditional on p). Because we think that the processes that shape wage gains within and between firms may differ, we allow full interactions by estimating separate models for the two cases.

In addition to the independent variables used in the analysis of first wages, we include the effect of the duration (in years) of the previous job, duration of spells of unemployment between the two jobs, and we distinguish first jobs from others.

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[4] Observation of both wages is less well predicted by the covariates than is the case for either first wage or for wage growth within jobs. Only education and employment in the public sector appear to be related to the probability that the ratio of wages is observed.

Findings

We begin with *job changes within firms* in columns 1 and 2 of Table 2. The mean of the dependent variable indicates that the average wage gain in changing jobs within firms is 20% (exp[0.196] = 1.20). Individual characteristics, such as age, education[5], experience, and duration of previous job do not significantly affect wage gains due to job changes within firms. The only significant effect of an individual characteristic concerns movement from first jobs. Transitions from first jobs produced significantly higher wage gains than subsequent transitions. The absence of a significant effect of education seems to support the view that education is a signal used by employers who lack direct information on productivity. Once an individual has worked in a firm, the signal is presumably unimportant as we find here. This suggests that general education certificates are important at the ports of the entry of the labor market, but once employers have the opportunity to directly observe and evaluate workers these certificates as signals of presumed productivity lose their significance.

Several employer characteristics predict the gain in the wage from changing jobs within firms. In column 1 of Table 2, the effect of leaving a skilled job is positive and significant, but the effect of entering a skilled job is insignificant. The effect of size is positive but is also not significant. However, the interaction of size and skill-level of the origin job is negative and significant. The combination of the main effect of size and the interaction effect of size and skill implies that unskilled workers in large firms received above average wage increases on switching jobs. Notice that the negative interaction effect runs opposite the prediction of internal labor market and dual labor market theory. Wage gains were significantly lower according to our estimates in that sector of the labor market in which these theories claim that wage growth is highest, due to movement along organizational careers.

Column 2 adds six dummy variables reflecting industrial segments as they have been defined by Stinchcombe (1979) and applied to West Germany with the same data set by Carroll and Mayer (1986). As in the case of starting wages on first jobs, this addition improves the fit significantly at the .01 level. Three of the six segments have average wage gains significantly below those of the excluded category: classical capitalist industries. These are small competitive industries, competitive craft industries, and engineering-based industries. Again we have a finding that disagrees with segmentation theories. Those sectors in which internal careers abound, engineering-based industries, professional service industries, and bureaucratic service industries, have on the average lower, rather than higher, average wage gains due to internal job change. Carroll and Mayer (1986) found

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[5] We also apply the metric using years of education required to obtain the observed combination of formal schooling and vocational training as discussed above. This shift, which saves degrees of freedom, does not alter the substantive findings.

that the engineering-based industries and bureaucratic service industries were characterized by significantly higher rates of moves within firms. The picture of segmentation by industrial sector is therefore a complex mixture of more frequent job changes with small gains in wages in the engineering-based industries and bureaucratic services.

Table 2: Estimates of Log-Linear Models of Determinants of Ratios of Starting Wage Rate on Job N + 1 to Finishing Wage on Job N (Standard Errors in Parentheses)

Independent variables	Within firms				Between firms	
	Model 1		Model 2			
Intercept	−.430	(.481)	−.067	(.493)	.469	(.852)
Individual characteristics						
Age	.004	(.011)	.000	(.011)	−.017	(.011)
Education	.015	(.028)	.022	(.028)	−.023	(.020)
Education * trend	−.001	(.001)	−.002	(.001)	.001	(.001)
Experience	.001	(.009)	.0003	(.009)	.009	(.007)
First job (Job N)	.113*	(.052)	.079	(.051)	.125*	(.034)
Duration (Job N)	−.001	(.013)	.007	(.013)	.007	(.010)
Duration of unemployment					.022	(.015)
Labor market segments						
Public (Job N)	−.013	(.062)	.005	(.063)	.110	(.084)
Public (Job N + 1)					−.063	(.037)
Large firm (Job N)	.088	(.078)	.119	(.079)	−.218**	(.071)
Large firm (Job N + 1)					.212**	(.045)
Skilled job (Job N)	.254*	(.109)	.207	(.106)	−.101*	(.050)
Skilled job (Job N + 1)	−.051	(.083)	−.017	(.082)	.111*	(.046)
Large * skilled (Job N)	−.248*	(.098)	−.243*	(.097)	.182**	(.058)
Large * skilled (Job N + 1)	.120	(.074)	.104	(.073)	−.156**	(.055)
Primary industries			.515	(.356)		
Small competitive industries			−.272**	(.095)		
Competitive craft industries			−.242**	(.080)		
Engeneering-based industries			−.252**	(.068)		
Professional service industries			−.161	(.112)		
Bureaucratic service industries			−.108	(.086)		
Aggregate conditions						
Trend (in years since 1950)	.018	(.014)	.016	(.014)	−.019*	(.009)
Unemployment rate	−.006	(.005)	−.003	(.005)	−.009**	(.003)
% change in GNP	.003	(.006)	.002	(.006)	−.004	(.004)
Probability of inclusion						
λ	.630	(.569)	.264	(.573)	.519	(1.10)
Number of cases	359		359		1259	
R^2	.11		.17		.09	
Mean of dependent variable	0.196		0.196		0.177	

* $p < .05$; ** $p < .01$.

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A search-theoretic explanation for the negative and significant effect of some industries is, that once somebody has joined a well-paying industry where otherwise expensive machinery would remain idle in this firm a worker will suffer a loss in wages if he changes employment within the firm because the firm will have additional costs of recruiting somebody else into his former position within the same firm. Hence, capital intensive firms will try to discourage workers from changing jobs. Higher wage growth could be granted on the same job to discourage job mobility, which we shall analyse in section 3.5.

We now turn to *job changes between firms*. Column 3 of Table 2 reports estimates of the effects of determinants of wage gains due to changes of employer, which are much more frequent than job changes within firms. However, the average gain in wages of 18% is slightly smaller in this case. In analyzing changes of employers, we must take account of characteristics of old and new employer. We do so in the model whose estimates appear in column 3 using Blossfeld and Mayer's (1988) characterization of labor market sectors. We do not report estimates of models using Stinchcombe's (1979) sectors since that requires 12 covariates to represent origin and destination sector and none of the six dummy variables representing origin sector have significant effects of wage gains.

As in the case of movement within firms, the only individual characteristic that affects wage gains is the variable "first job." Men who moved to new employers from their first job have significantly higher gains in wages. The absence of significant effects of education and experience does not correspond to any of the theoretical perspectives discussed in chapter 2 nor with the derived hypotheses.

In this case of job changes between firms, labor market segments have strong and significant effects on wage gains. Consider first the effects of size of the employer of origin and destination. The effect of moving from a large firm is negative and significant. On average, those leaving large firms experience a loss of roughly 20% (exp[-0.218] = 0.80). But moving into a large firm has a significant positive effect on the wage of roughly the same magnitude. So moving from one large employer to another has essentially no effect on the wage rate. By the same token, moving from a small to a large employer does increase wages on average. This means that movement from the periphery to the core of the economy does improve wage rates as has been claimed by proponents of segmented labor market theory.

Leaving a position requiring a high standard of qualifications lowers the wage rate significantly, and movement into a skilled position increases the wage significantly. Again the two effects are approximately equal in absolute value. So movement from the secondary to the primary segment of the labor market is rewarded with a substantial gain in wages.

So far we have considered only the main effects of two dimensions that distinguish labor market segments. A strong version of internal-labor-market theory, as formalized by Blossfeld and Mayer (1988), insists that the effects of size and skill level are not additive. Rather the category of large/skilled, where internal labor markets are likely, should pay higher wages than would be predicted by the additive effects of size and skill. That is, there should be a positive interaction effect of size and skill. Column 3 contains two such interactions, one for employer of origin and one for employer of destination. Both differ significantly from zero, indicating that the effects are indeed nonadditive. The signs of the two interaction effects differ. The effect of leaving an internal labor market (large*skilled), net of the additive effects of size and skill, is positive. This interaction effect largely offsets the negative effect of leaving a large firm. So it is workers leaving unskilled jobs who lose wages when they leave jobs in large firms. The interaction effect of size and skill for destination job is negative, whereas the additive effects of destination size and skill are positive. This combination of results means that workers moving to internal labor markets gain less than the additive combination of effects of moving to a large firm and moving to a skilled job. This pattern is consistent with the view that internal labor markets tend to emphasize renumeration of longterm employment.

Though the estimated effects of public sector employment are not significantly different from zero, they are substantively interesting. Moves from employers in the public sector produce an average wage gain of about 12%. Moving to an employer in the public sector is penalized with a loss in wages of about 6%. The fact that moves into the public sector are penalized in terms of wages may reflect a premium paid for higher job security (Weigend 1982). But it may also be the case, as we show below, that employers in the public sector operate as internal labor markets, offering low entry wages but high subsequent growth in wages.

Historical time of the change from job n to job n+1 has a negative effect on wage growth. The later a job change occurred historically, the lower is the gain in the wage from changing firms. Despite the strong secular trend toward higher first wages, the trend in relative wages between jobs is negative. Combining the negative but insignificant effect of age and the negative time trend we find an almost opposing effect of social change on the earnings at job changes between employers. This finding is particularly interesting because it captures the socio-economic conditions of the West German labor market in comparison to, for example, the United States of America. In much of the post-war period in West Germany firms faced some shortage of higher qualified senior level techniciens. In paying high wages in one firm workers had much to loose by changing to another firm usually in terms of benefits to seniority. The vector of social change defined in section 2.3 on cohort analysis and vintage effects points more in the direction to discourage between firm job mobility for West German men.

The unemployment rate at the time of the move has a significant negative effect on the wage gain. In the early seventies historical macroeconomic conditions changed drastically. Raising inflation and levels of unemployment made between firm job mobility a much riskier event. In fact, as Shapiro and Stiglitz (1984) described, high levels of unemployment appear to have been used as a worker discipline device (compare section 2.6 on efficiency wage models). The increasing probability to be unemployed for prolonged periods in case being dismissed has had negative effects on wages at job changes between employers. Firms had the easier possibility to replace workers who were demanding excessive wage increases with those currently unemployed. The threat of dismissal is much more credible in periods of higher unemployment.

The analysis of wage change between firms reveals again the importance to apply a life-course perspective of different processes of wage attainment on the labor market. Additionally the long run individual data observed in the German Life History Study allow us to learn more about the importance of the first job in a person's occupational career. Leaving the first job is rewarded in both porcesses of within and between firm job changes indicating either bad matching of unexperienced labor force participants, or a substantial training component of first jobs even in the West German labor market where a substantial part of education (apprenticeships) is done in the dual system of combined firm-based training and schooling.

A second major innovation is the empirical confirmation of the macro-economic effect that higher rates of unemployment will have a negative impact on individual labor market behavior. This effect is confirmed for between firm wage gains. At times of higher rates of unemployment there are smaller wage gains to be realized when changing jobs between employers. Within firm wage gains at job changes with the same employer are not affected by such an indicator of "macro-economic climate". These results highlight problems of studies of occupational mobility or wage attainment which are based on cross-section data or even short run longitudinal panel data, since gainful job mobility between firms is to some degree dependent on general economic indicators. Short run observations of the wage attainment process might therefore not fully capture the sizable and significant effects of economic cycles on wages.

The significance of the time trend in the analysis of wage changes between employers indicates that a precise location in historical time is necessary to understand the size and importance of individual and firm level effects on the process of wage gains at jobs changes between firms. The conditions on the labor market during the 1950s have been more favourable to achieve wage gains at changes of employers. Similar effects might be observable in the reunified Germany of today. In more general terms there is evidence that labor market theories would benefit in their explanatory power if they could advance hypotheses with more historical detail at least some historical content concerning macro-economic cycles.

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3.5. Wage Growth Within Jobs

We now turn to the process that has received least empirical attention: wage growth within jobs. In shifting to this topic, we move from consideration of static questions about point-in-time events to dynamic questions about processes that unfold over time.

Existing theory suggests that real wage rates rise with duration of a job. But there is disagreement about the shape of the time path of growth. Mincer's (1974) extension of the human capital approach claims that wage rates grow with duration at a decreasing rate. He assumes that every job involves some learning-by-doing so that job-specific human capital grows with duration. As a consequence, wage rates rise with duration because productivity rises with the employee's stock of human capital. But since the acquisition of useful knowledge presumably grows at a decreasing rate with duration, wage rates increase with duration at a decreasing rate.

The theory of shirking suggests that the rate of growth in wage rates does not fall with duration (Bellmann 1986). The exact amounts and kinds of work required in many jobs are hard to specify in labor contracts. Therefore, there is a possibility, or at least an incentive, for workers to shirk. One solution to this problem is for the firm to organize its wage structure so that workers lose substantial levels of earnings if they are detected to shirk. Lazear and Rosen (1981) provide an example of what such a wage structure would have to look like. For example, if an employee is paid below his marginal product of labor during the first few years on the job, he accumulates a bond which is paid back on top of his usual wage later. Older workers therefore will have higher wages than younger workers, but not because of a difference in their productivity. The positive slope of an age-earnings profile increases the penalty for shirking among experienced workers. The point, for our analysis, is that such a wage system would evidence wage rates that increase with duration at an increasing rate.

Examining the effects of education again allows a contrast of the opposing views discussed above. If education reflects real human capital that has value to employers and pays off over a career, then rates of wage growth are positively related to education at time of entry into a job. If, on the other hand, education has only a signalling value, then it has no influence on wage growth within jobs. Education as a screening device would suggest that educational qualifications are used for selection into career track positions. This implication holds more strongly if one assumes with Thurow (1978) that productivity is a property of a job rather than of the worker who fills it. Bartel's (1980) analysis of the Coleman-Rossi data on American men indicates that education has had a positive effect on wage growth within jobs.

Theories of dual labor markets and segmented labor markets make an unambiguous prediction. Wage growth should be higher for jobs in the "core"

than in the "periphery" of the labor market. As we have discussed these issues above, this prediction means that wage growth should be higher in large firms and in skilled jobs. There should also be a positive interaction effect between size and skill, reflecting the presumed wage payoffs to participation in internal labor markets. Following the Stinchcombe classification we would expect higher wage growth in those segments where firms have some monopoly power. They could share those rents to monopoly power with their more long term employees.

Model

We know the wage rate only for the first and last month of each job. Thus we cannot analyze time paths of changes in wages during jobs. Instead we construct a model of change over the entire spell. We begin with the assumption that the wage rate changes continuously with duration on a job (t) and that change is proportional to the level of the wage:

$$dW_t/dt = r_t W_t. \tag{3}$$

We assume further that the growth rate, r_t, varies from person to person and with duration on the job. Let x denote a vector that contains individual characteristics, such as education and age, and job characteristics, such as labor market segment. We assume that each individual spell is characterized by its own random growth rate, which depends on the vector x. In addition, we assume that the rate changes linearly with duration[6]:

$$r_t = \alpha + \beta' x_0 + \tau t + z(t) . \tag{4}$$

We assume that the disturbance term, $z(t)$, is a white noise process with mean zero.[7] White noise is a continuous-time stochastic process with uncorrelated increments. So this assumption parallels the usual assumption that the disturbance has a mean of value equal to zero and is uncorrelated over time.

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[6] We also examined the possibility of nonlinear change in growth rates with duration. We found that adding nonlinear terms did not improve the fit significantly over the model of linear change. Nor did it alter other substantive conclusions.

[7] Because we lack time series data on wage rates within jobs, we cannot explore possible autocorrelation in disturbances.

Combining the two equations (3) and (4) into one single equation and reorganization yields

$$dW_t/W_t = [\alpha + \text{\ss}'x_0 + \tau t + z(t)] \, dt \qquad (5)$$

and integrating the stochastic differential equation subject to the initial condition $W(0)=W_0$, yields

$$\log(W_t/W_0) = \alpha t + \text{\ss}'x_0 t + \tfrac{1}{2}\tau t^2 + u(t), \qquad (6)$$

where u(t) is the time integral of a white noise process:

$$u(t) = \int_0^t z(s) \, ds = B(t) - B(0), \qquad (7)$$

where B(t) denotes a Brownian motion process with mean zero and variance σ^2. In other words, by our assumptions, the disturbance term is an increment in a Brownian motion process. Such increments are normally distributed with mean zero and variance $\sigma^2 t$ (Tuma and Hannan 1984: 388-393).

Since by our assumptions, the disturbance in (6) is normally distributed and is uncorrelated with the regressors, ordinary least squares estimators are consistent. However, since the variance of the disturbance is a linear function of duration according to this model, OLS is inefficient due to heteroscedasticity of disturbances. However, it is straightforward to correct this problem using the method of indirect least squares (ILS). In this context, ILS consists of applying OLS to the transformed equation:

$$\log(W_t/W_0)/\sqrt{t} = \alpha\sqrt{t} + \text{\ss}'x_0 \sqrt{t} + \tfrac{1}{2}\tau t^{3/2} + u/\sqrt{t} , \qquad (8)$$

or

$$\log(W_t/W_0)/\sqrt{t} = \pi_1\sqrt{t} + \pi_2'x_0 \sqrt{t} + \pi_3 t^{3/2} + v(t). \qquad (9)$$

Equation (9) is the regression model that we actually used. Its disturbance term, v(t), is homoscedastic according to the assumptions of the model. So we use OLS in forming the IV estimator that corrects for selection bias due to missing data.

Notice that the coefficients of the regression model in (9) are transformations of the structural parameters of interest in equations (3) and (4):

$$\pi_1 = \alpha, \quad \pi_2 = \text{\ss}, \quad \text{and} \quad \pi = \tau/2. \qquad (10)$$

The intercept does not have a dynamic interpretation. It reflects only the distribution in relative wages over all spells (of varying durations).

In addition to analyzing the model in (3) and (4), we also estimated models in which the effects of covariates on growth rates change with duration. In general, adding interactions of covariates and duration does not improve the fit of models significantly. We did however learn that there is a strong interaction of first job with duration. Therefore we include this interaction in all of the models discussed below.

The men in the German Life History survey reported a total of 3629 nonagricultural jobs (3103 for women). We have records of starting and ending wages for 2541 of these jobs for men and 1976 for women (including those that were right-censored by the interviews). We correct for possible sample selection bias using the IV estimator described above.[8]

Findings

Due to the greater complexity of this model, we begin with a relatively simple model that contains the effects of duration, age, education, labor force experience, first job, an interaction of first job and duration, and aggregate conditions at time of entry into the job. ILS estimates of this model appear in column 1 of Table 3. Columns 2 and 3 report estimates of models that add indicators of labor market segments to the model in column 1.

Consider first the effect of duration. Recall that the effect of duration estimates the initial growth rate in the wage and that the effect of the square of duration tells how the growth rate changes with duration. In all columns in Table 3, the initial growth rate is positive and the rate of change over duration is negative. According to the estimates in column 1, the initial growth rate is 0.072 per year. But the rate declines at -0.0011 per year. So the growth rate is positive over the longest durations we observe. But it is cut in half by the time duration on a job has reached 20 years. This result confirms that profiles of duration and earnings are concave as postulated by the human capital approach (Mincer 1974) and in opposition to the shirking or efficiency wage models (Bellmann 1986, Akerlof and Yellen 1986).

The effect of age at entry is negative (and significant in columns 2 and 3). The later in life a person starts a job, the smaller is the growth in wage rates. However, the effect of labor force experience at the beginning of a job spell does not differ significantly from zero in any column of Table 3.

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[8] The probability that both starting and ending wages are observed appears to be related to duration, starting time, skill level, and public employment. Because the effect of duration is negative (probability is higher for shorter spells) and the dependent variable is positively related to duration, we find that the effect of the predicted probability of inclusion on the growth in wages is negative.

Education significantly increases the rate of wage growth. Since the range of education runs from 9 to 19 years, the estimated effect of 0.002 means that the growth rate at the top of the educational scale is twice that at the bottom.

Table 3: Estimates of Stochastic Differential Equation Model of Wage Rate Growth Within Jobs (Standard Errors in Parentheses)

Independent variables	Model 1		Model 2		Model 3	
Dynamics						
Initial growth rate ($\sqrt{Dur}$)	.0650**	(.0148)	.0711**	(.0154)	.073 9**	(.0157)
Rate of decline ($Dur^{3/2}$)	−.0011**	(.0003)	−.0011**	(.0003)	−.0012**	(.0003)
Individual characteristics[+]						
Age	−.0013	(.0008)	−.0017*	(.0008)	−.0017*	(.0008)
Education	.0022*	(.0009)	.0016	(.0009)	.0022*	(.0009)
Experience	.0006	(.0008)	.0010	(.0008)	.0009	(.0008)
First job	.0482**	(.0073)	.0466**	(.0073)	.0471**	(.0073)
First job * $Dur^{3/2}$	−.0014**	(.0004)	−.0013**	(.0004)	−.0013**	(.0004)
Labor market segments[+]						
Public			.0074	(.0040)		
Large firm			−.0012	(.0064)		
Skilled job			.0089	(.0062)		
Large * skilled			.0018	(.0075)		
Primary industries					.0329	(.0298)
Small competitive industries					−.0075	(.0068)
Competitive craft industries					−.0078	(.0056)
Engeneering-based industries					−.0037	(.0051)
Professional service industries					−.0053	(.0089)
Bureaucratic service industries					.0094	(.0065)
Aggregate condition[+]						
Trend (in years since 1950)	−.0018**	(.0003)	−.0018**	(.0003)	−.0018**	(.0003)
Unemployment rate	−.0007	(.0004)	−.0007	(.0004)	−.0007	(.0004)
% change in GNP	−.0005	(.0006)	−.0005	(.0006)	−.0005	(.0006)
Probability of inclusion						
λ	.0516**	(.0074)	.0529**	(.0074)	.0518**	(.0074)
Number of cases	2541		2541		2541	
R^2	.216		.219		.220	
Mean of dependent variable	.0855		.0855		.0855	

* $p < .05$; ** $p < .01$.
[+] Covariate are multiplied by $\sqrt{Dur}$ (see text).

The main effect of first job is positive. This result agrees with the notion that generalized work skills accumulate especially rapidly when an individual first takes employment. The interaction of first job and duration is significant and negative. So the rate of wage growth in first jobs is initially rapid but slows more quickly than in other jobs. The fact that wage growth slows rapidly in first jobs may explain why we found above that wage gains on leaving first jobs were higher than average gains in leaving jobs.

Historical time of entry also affects wage growth on a job. The later in this period a job begins, the smaller was the average wage growth. This trend, which parallels the trend toward falling wage gains due to changing employers, runs counter to the trend of rising initial wages. It highlights the importance to separate the three processes we distinguish because the opposite direction of the time trend in these processes would be lost in a joint analysis.

Historically we observe the interesting pattern that in the post-war period starting wages for new labor market entrants have risen over time whereas wage growth for those already in the labor market for some time have witnessed reduced wage growth on the job, i.e. flatter earning profiles. For those with recent education and training wages have been rising over time. This indicates that historically there is a shift towards higher remuneration of those with recent training compared with those with longer on-the-job experience. The process of modernazation and rapid technological innovation could be responsible for this historical pattern.

A major surprise in this analysis is the fact that labor market segments do not appear to affect wage growth within jobs. The second column in Table 3 reports estimates of a model that adds labor market segments to the model in column 1. Not only does the addition of these variables fail to improve the fit of the model significantly, the effects of size of employer, skill level, and the interaction of the two are also insignificant individually. There is no evidence here that labor market segments in the private sector have differed in rates of wage growth. Column 3, which adds six dummy variables describing industrial labor markets tells a similar story. The set of variables is not jointly significant. Neither are any of the individual point estimates.

So this analysis, like that concerning moves within firms, raises a problem for segmentation theories. We find no evidence that sectors differ in the rates at which wages grow over time. Workers in the peripheral sectors do not fall behind those in the core within jobs. According to the search-theoretic model there are not necessarily further differences between industrial sectors for patterns of wage growth. The model demands only higher wages for new entrants into firms with expensive machinery but is different towards wage profiles.

The negative and significant time trend indicates the worsening of general conditions for higher wage increases on the job. This variable is a pool of influences without being able to precisely identify the source of this effect. Some

weakening of trade union power as a social phenomenon might be present. It is also possible that some kind of technological change, loss of wage bargaining power, or increased international competition and less leverage for wage increases within firms is present.

3.6 Discussion

The West German labor market seems to have rewarded persistence in employment relations. The average gains to moving to new employers is small and those with educational advantages do not experience any additional gains to such moves. On the other hand, duration in jobs has been rewarded with continually increasing real wages. And those with advantage appear to have gained more than others by remaining on a job.

Education seems to have played a controlling role in two of the components of the process. As we have seen, education has powerful effects on first wages, albeit an effect that has weakened over the forty year period. Education does not appear to have affected the gains from changing jobs and employers. But it does have a strong effect on wage growth within jobs. So the overall pattern involving effects of education is complex. Between cohorts, education's role in shaping initial wages has diminished. But educational differences produce growing inequality in wages within cohorts, as durations of jobs increase.

In discussing effects of education, we have contrasted two opposing views. One, represented in sociology by the status attainment tradition and in economics by human capital theory, builds on the assumption that schooling creates skills that the labor market rewards. The other, represented in sociology by notions of credentialling (Collins 1979) and in economics by strong versions of screening and signalling theory (Arrow 1973 and Spence 1974), holds that education simply conveys social worth or indicators of generalized ability. Both perspectives agree that education affects starting wages, as we have found. But only the first leads us to expect that education produces high levels of wage growth within jobs, which we also find. So on the whole our positive results support the first perspective. However, the view that educationed qualifications are a reliable screening device for otherwise unobservable heterogeneity of productive capacity of higher education credentials will also lead to higher wage growth on the job.

The loosely defined perspective claiming that modern labor markets contain advantaged cores and disadvantaged peripheries has mixed success here. Some indicators of gross differences among labor markets do affect starting wages. The four-fold classification into labor market segments (using skill level and size of work place) does not appear to affect initial wages. But industrial sector does appear to have affected initial wages. In particular, workers in the primary sector had significantly lower initial wages than workers in the competitive capitalist

sector but workers in craft industries and engineering-based industries had significantly higher initial wages.

Both types of labor market distinction affect the wage gains due to job change within firms. However, the pattern of estimated effects runs counter to theories of segmented labor markets. In the sector most likely to be characterized by internal labor markets (skilled jobs in large firms), wage gains to job change are significantly lower than in other sectors by our estimates. While three of the six dummy variables indexing industrial sectors have significant effects on wage gains due to job change within firms, the point estimates tell us that workers in sectors characterized by internal labor markets (engineering-based industries, professional service industries, and bureaucratic service industries) receive significantly lower wage increases when changing jobs within firms.

In the case of change of employer, the complicated pattern of effects of size and skill level (and their interaction) tend to agree with claims that movement into skilled jobs and into large firms causes wages to rise but that movement into internal labor markets (skilled jobs in large firms) does not convey an initial payoff in wages. Indeed the estimated effect of the interaction of size and skill level is negative. Apparently there is a wage penalty from moving into the internal labor market and benefit from the higher job security in such protected labor markets.

We find no evidence that these markets differ in patterns of wage growth within jobs. That is, workers in sectors that can reasonably be characterized as having internal labor markets have not experienced higher than average wage growth within jobs.

After this brief summary of the results we want to review in more general terms results concerning the hypothesis of the need to apply a life-course perspective to the process of inequality and wage attainment. Considering the ample results and the different effects education and indicators of labor market segmentation have on earnings at various stages it is no longer possible to deny the usefulness of this approach to disentangle the processes at work. As we have seen the role education and labor market segments play in the process of wage attainment are rather complex and simple analyses which confound the various processes are likely to arrive at biased results.

Our analysis so far stresses the importance of the transition from the education system to the labor market. Education plays an important role in the allocation of people to jobs and careers, as much as labor market segment do. Initial disadvantages among men can to some extent be compensated by gainful job mobility between segments when changing employers. The process of wage growth is neither increasing nor alleviating these initial differences in wages over prolonged job durations due to labor market segmentation at entry into the labor market.

Concerning the difficulty of separation of effects of education emanating from human capital investment or filter and credentialism we cannot reject clearly the hypothesis that human capital investments while in full-time education are worthwhile. For men education pays off at entry into the labor market and in higher wage growth while on-the-job. It could, however, be the case that education influences wage growth since there is a substantial number of people who continue their first job for long durations which could bias the results towards a finding of a positive effect for education on wage growth.

Efficiency wage models (Akelof and Yellen 1986) and the search-theoretic approach by Montgomery (1991) find little support in our empirical analysis. This is mainly due to the difficulty to develop precise hypotheses concerning the three processes we differentiate. Montgomery´s approach might be suitable to explain inter-industry wage differentials (with) taking a static or cross-section point of view but it cannot differentiate the processes or be interpreted in a dynamic perspective. Evidence in favor of efficiency wage models is equally sparse so far. The worker discipline device is only applicable to West German when they change jobs between employers.

Next consider the hypotheses outlined in section 2.9.2. on time dependency and a historically incorporated perspective. The inclusion of a time trend proved to be a significant variable in all processes except wage changes at job changes within firms. These historical trends towards higher starting wages and lower wage growth on-the-job are societal changes of the wage structure which have repercussions on the individuals earnings trajectories. Those macro-scopic trends even override specific effects of single birth cohorts on wage attainment.

Contrary to our expectation periods of high unemployment did not show an effect on wage at entry into the labor market for West German men. The impact of high unemployment on men's wages is only significant when men want to realize wage gains by changing jobs between employers.

The evidence presented so far describes some dimensions concerning the "vector of social change" as it affects West German men. Equally, we hope to have indicated the necessity to view the concept of the individual and society no longer as if they related to unchanging states as Elias (1978) proposed a long time ago. In order to identify further dimensions of such a vector of social change and how it affects individuals in society are presented in the following chapter four where we enlarge our analysis to include women into our analyses.

4. Comparing the Experience of West German Men and Women

4.1 Introduction

Many studies of income and labor earnings have shown that there is a sexual division between the earnings of men and women. Moreover, it has been demonstrated, that a great deal of this wage differential can be attributed to occupational segregation between men and women (Baron and Bielby 1984, Blossfeld 1987, Polachek 1981, Robinson 1986). Various explanations point out why we observe sexual segregation of occupations.

Human capital theories focus on productivity related characteristics of labor supply. General education, formal training and work experience, are believed to determine starting wages and subsequently wage growth. Differences in wages for men and women are due to differences in investment in human capital and differential number of years of work experience (Becker 1971, Mincer 1974). Since women anticipate longer interruptions of their labor market participation they tend to invest less in training than men, because women have less years over which they can recoup the costs of their investment in education including accumulated foregone earnings. Disrupted work lives in industries with rapid technological advancement will devalue formal training and earnings at reentry faster than other industries.

Although men and women appear to invest equal amounts of years in general education or general skills since the 70s, Blossfeld (1985), women avoid, or do not have access to jobs for which firm-specific training is required. Such jobs will have particularly steep age-earnings profiles, but wages for these jobs start from an initially lower level. The prediction of the human capital theory for differences in age-earnings profiles for men and women therefore is, that because of an anticipated shorter working life women choose flatter age-earnings profiles. In other words, women prefer higher wages at an early stage to the prospect of higher future earnings after extensive firm-specific training and stable attachment to a firm or the labor force.

Another school of thought which has been named the statistical discrimination perspective holds that employers perceive, that there is a difference in the returns to hiring men or women. This may be due to the employer's view that women are more likely to quit their jobs (Blau and Ferber 1986, Halaby 1982). Since there is some amount of training given to new employers, high turnover of female employees is more expensive to employers, and, hence, this will influence their hiring decision. Sex discrimination is considered to be not simply paying lower wages to women although their productivity is the same, but also when employers deny women access to employer-sponsored training programs. Not having access to firm-specific training will put women on shorter career ladders with smaller growth in wages. Customer prejudice can also be the source of an employer's

dicriminating behaviour in case customers do not consider services of women to be of equal value.

If discrimination against equally qualified women is more the rule than the exception its persistence over time will have continuous feedback effects on those women entering the labor market, on their decision whether to stay in full-time education or not, and on their occupational choice.

A third view of the labor market emphasizes the division of labor markets into segments of industries and firms, which are organizationally distinct (Stinchcombe 1979, Rosenfeld 1983, Dickens and Lang 1985/1988). It is assumed that in different segments of the labor market rewards vary accordingly. Jobs in the primary segment convey high job security and above average earnings. Jobs in the secondary segment offer lower earnings and frequently feature temporary or short-term employment contracts. Jobs in the "core" provide extensive firm-specific training, which in case the firm bears most of the costs of this training will have the consequence that firms want employees to stay with them for the longest time possible. In case the employees pay themselves for their training it is in their own interest to stay with the firm as long as possible, assuming these skills are not transferable to other firms. Therefore such jobs will offer steeper wage growth and will also show typically concave age-earnings profiles. Secondary jobs, based on shorter employee-firm attachment offer less on-the-job training and therefore wage growth in such jobs will be much smaller. Age-earnings profiles in those jobs will be flatter than those in the primary segment.

The analyses we report in this paper attempt to join these lines of arguments and research. Our research strategy is, as in an earlier paper (Hannan, Blossfeld, Schoemann 1989), to split up the analysis of lifetime earnings into three processes: (1) a person's first wage, (2) wage gains due to job changes, and (3) wage growth within jobs. Three questions will provide the focus of our research interest:

(1) Do men and women start from the same level of wages and in case they do not, what determines the difference in first wages?

(2) Do men and women have similar wage changes if they change jobs between firms?

(3) Is wage growth on a job when no interruption occurred the same for men and women?

In our analysis of these three different processes of lifetime earnings we shall extract empirically relevant hypotheses of four perspectives: the human capital/status attainment approach, the signalling/credentialling approach, the models of segmentation, and the discrimination perspective.

4.2 Sex Differences in Starting Wages of First Jobs

We begin our analysis of age-earnings profiles by focussing on the determinants of first wages. An abundant number of studies have addressed this topic. Two studies for West Germany by Blossfeld (1985) and Handl (1988) came to different conclusions. Both authors agree, that there has been a substantial equalization of educational attainments and an increased occupational segregation between men and women. However, they differ in the view, whether this occupational segregation increased or decreased disadvantages of women.

Following the human capital approach higher investments in education of later cohorts of female labor force participants should narrow the wage differential between men and women, if lower starting wages for women were due to a lack of education previously. If more women reach higher education they should also have access to jobs which use higher education as some sort of entry barrier or screening device (Arrow 1973). Additionally the human capital theory predicts that women anticipate interruptions of their careers and choose certain occupations accordingly (Polachek 1981). Women tend to favor occupations which require less investment in on-the-job training, and choose occupations where the depreciation of human capital due to rapid technological advancement is minimized. Consequently most women will shun away from jobs for which firm-specific training is particularly lengthy and important.

Based on the assumption of equal number of years in general education Blau and Ferber (1986) expect the experience-earnings profiles of women (F F') to be flatter than the one for men (M M') (compare Figure 8). If employees have to bear a substantial share in the cost of job-specific and firm-specific training, which ensures stable employment to employers and which delays the rewards to the investment to a later point in a person's career, the profile for those investing in firm-specific training will start from a lower first wage, but will show steeper wage growth on the job, to reach a higher top level of wages.

Most important for our analysis of first wages is to recognize, that women who do not want to invest in firm-specific training, or who do not have access to jobs offering firm-specific investment, therefore, will have higher first wages than men. Higher starting wages for women result because they do not have to share the costs of firm-specific training, which will later leave them behind concerning wage growth due to training provided on-the-job.

Confirmation of such an experience-earnings profile would mean cross-section analysis of earnings overestimates earnings discrimination against older women, since those men with high wages partly had to pay for their investment with lower earnings than women at an earlier point in their career, but earnings discrimination of younger women can be masked due to the same process.

The perspective of statistical discrimination (Becker 1971) holds that despite of an equalization in general education women will still face lower wages because

employers do not equally reward general education for men and women. Higher quit rates of women and a higher probability of time spent out of the labor force are responsible for employers' views that employment of women is more costly to firms. A higher level of education will not necessarily ensure employment in a job requiring a certain level of education. Thurow's (1975, 1978) model of job competition argues similarly, that the relevant skills are acquired on-the-job and employees are ranked in a queue according to their training costs to employers. Higher quit rates of women will allocate women to places behind most men in such job queues.

FIGURE 8

AGE-EARNINGS PROFILES OF MEN AND WOMEN

Earnings

MM'

FF'

Age

S   Rf   Rm

Source : Blau and Ferber (1986)
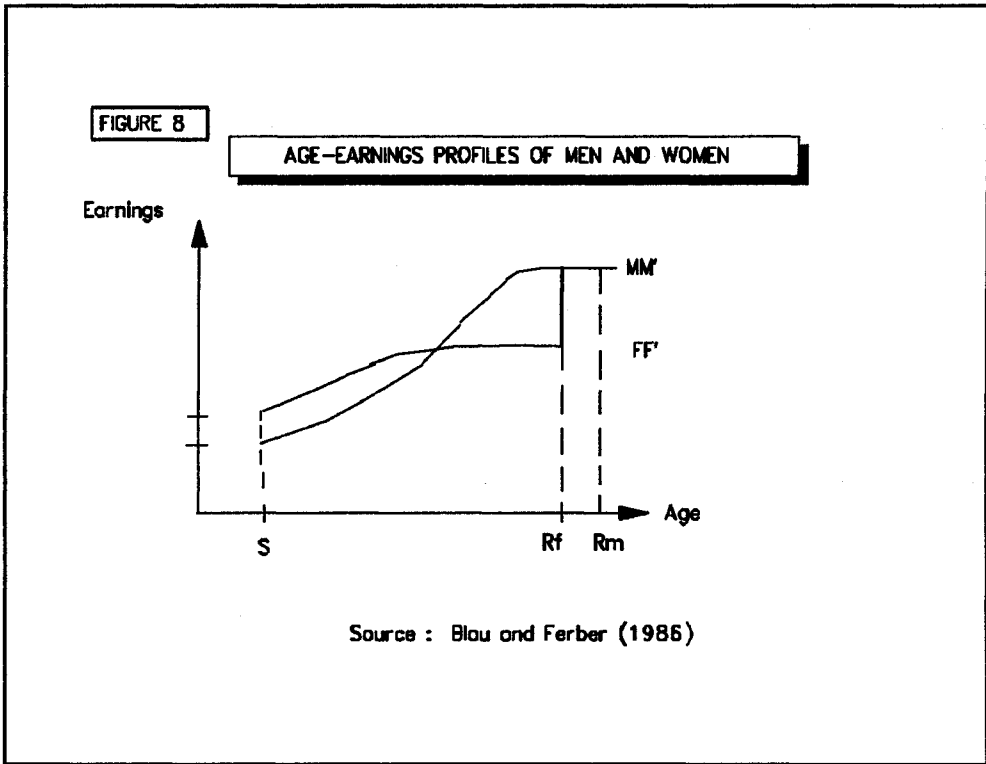
The analysis of starting wages of men as discussed in chapter 3 indicated the importance of education and gave evidence for the existence of a segmented labor market for men. Since the occupational segregation of women in professional and bureaucratic service industries and the public health sector has already been documented (Lappe 1981, Polachek 1981, Rosenfeld 1983, Blossfeld 1987), we expect to find some indication of a segmented labor market when women first enter the labor market. Because of the above mentioned special features of female employment histories they will be employed only in certain industries or occupations when they start their first job. Since there is occupational segregation

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in addition to segmentation we should find a segmentation which is different to the one found for men.

Search-theoretic models and efficiency wage models make very little distinction between earnings of women and men. Only higher unemployment for women will operate as a stronger worker discipline device for women and therefore depress their wages.

Findings

As in the analysis of men, education and the interaction of education and time trend are both significant in the analysis of women (see Table 4). However, astonishing is the sizeable difference of the impact of an additional year of education for men and women on the log of the first wage. At the maximum level of education, 19 years of schooling or university degree level, women obtained a wage of up to 6 times the value of those with compulsory minimum years of schooling. The corresponding figure for men was 3 times. This highlights that the inequality of returns to education for the first job is twice as high among women compared to men. It also reveals the greater importance of higher education for women if they are to obtain high starting wages. This result is in line with studies by Helberger (1983), Blossfeld (1985), and Gerlach, Schasse, Vathäuser (1988) for West Germany and Bartel (1980) for the U.S.

A statistically significant change occured in the returns to education for both women and men between 1950 and 1975. Table 4 Column 2 indicates that wage differentials due to different levels of education have narrowed and slightly more so for women. However, model 2 including six dummies for industries, estimates the same size of the coefficient for women and men. Therefore we conclude, that the starting wage advantage of both higher educated men and women compared to those with minimum years of education was cut in half during the period of 1950 and 1975. This supports the view that educational credentials have the character of signals of productivity to employers, but the more people dispose of this signal the lower its value. The value of such a signal or filter (Arrow 1973) is largely its ability to differentiate between apparently equal applicants. If there are too many job applicants with the same credential then additional filters have to be introduced to make the choice between applicants.

The second group of variables deals with labour market segmentation. Structuring the labour market according to size of firm and skill level (Blossfeld and Mayer 1988) yields only one significant effect. In skilled first jobs women seem to obtain above average wages. This result, however, is not confirmed in the second model where we included the specification of industrial labor markets (Carroll and Mayer 1986) in the model.

The fit of the model for both men and women increased significantly after the inclusion of these variables. The estimated effects of education remain virtually unchanged. Primary industries (i.e. fishing, forestry and animal related industries) are found to pay significantly less than all other sectors for both men and women.

Table 4: Estimates of Log-Linear Models of Determinants of First Wage Rates (Standard Errors in Parentheses)

| Independent variables	Model 1				Model 2			
	Men		Women		Men		Momen	
Intercept	−1.74	(.909)	−.400	(.546)	−2.14*	(.900)	−.117	(.538)
Individual characteristics								
Education (years)	.111**	(.027)	.188**	(.032)	.109**	(.026)	.184**	(.031)
Education * trend	−.003*	(.001)	−.005**	(.002)	−.003*	(.001)	−.003*	(.002)
Labor market segments								
Public	.158	(.100)	.132	(.102)	.221	(.117)	.182	(.111)
Large Firm	.087	(.129)	−.088	(.170)	.050	(.128)	−.219	(.167)
Skilled job	−.093	(.108)	.201*	(.080)	−.095	(.106)	.139	(.079)
Large * skilled	.213	(.149)	.006	(.129)	.181	(.147)	.025	(.128)
Primary industries					−2.36**	(.737)	−1.43**	(.441)
Small competitive industries					.028	(.104)	−.164	(.084)
Competitive craft industries					.375**	(.087)	.089	(.156)
Engeneering-based industries					.326**	(.084)	.027	(.107)
Professional service industries					.118	(.157)	−.433**	(.086)
Bureaucratic service industries					.131	(.128)	.039	(.132)
Aggregate conditions								
Trend (in years since 1950)	.076**	(.016)	.124**	(.019)	.072**	(.016)	.106**	(.019)
Unemployment rate	.004	(.005)	.007	(.006)	.003	(.005)	.008	(.006)
% change in GNP	.009	(.010)	.013	(.010)	.009	(.010)	.014	(.010)
Probability of inclusion								
λ	1.74	(1.06)	−1.71	(.586)	2.04	(1.04)	−1.74	(.574)
Number of cases	782		729		782		729	
R²	.29		.424		33		.460	
Mean of dependent variable	1.52		1.19		1.52		1.19	

* p < .05; ** p < .01.

The other negative and significant effect for starting wages is found for women in the professional service industries. These industries include the health and education sector. Apparently this is the sector of the economy in which most women find employment (Polachek 1981, Lappe 1981, Müller, Willms, and Handl 1983, Robinson 1986), and this sector pays women less than men at the beginning of their career. It is also shown, that the well-paying industries for men, competitive craft industries and engineering-based industries, do not similarly favour women working in these industries.

A striking result is reflected in Figure 9. There we have ordered industrial segments according to the size of the estimated coefficients on industrial segments and the percentage distribution of women and men across these labor market segments as observed in the German Life History Data. The well-paying industrial segments are clearly dominated by male workers and women are particularly crowded into the low-paying segments. A clear policy implication of this is that increased educational efforts, if the kind of education courses women choose remains unchanged, will not improve the relative position in the distribution of labor earnings. The search-theoretic model by Montgomery (1991) has serious problems to explain the pattern of interindustry wage differential we find. First, the theory does not differentiate men and women to face a different interindustry wage structure. If industries offer higher wages to fill vacancies quickly there is an argument for a taste for discrimination of certain industries since the probability of women to fill such vacancies in well-paying industries is markedly lower as reflected in figure 9. Second, the hypothesis by Montgomery (1991) that interindustry wage differentials are persistent has found some confirmation in our estimates of wages at entry into the labor market. We cannot support the generality of the argument that these interindustry differentials are correlated with capital intensity. The theory seems to explain more the earnings of men rather than women.

Yearly changes in aggregate conditions, to our surprise, did not have any impact on starting wages neither for men nor for women. Only the significance of the time trend reflects a tendency that labor earnings of women grew faster than men's wages, which indicates some narrowing of the wage differential between men and women during the years 1950 and 1981. Despite of that, the mean of the dependent variable still shows on average higher starting wages for men than for women. This is to some extent still surprising considering that it has been shown, that men have also steeper and longer careers than women (Halaby 1982, Tuma 1985, Mayer 1987, Mincer and Ofek 1982).

FIGURE 9

The Distribution of Women and Men across Industrial Segments
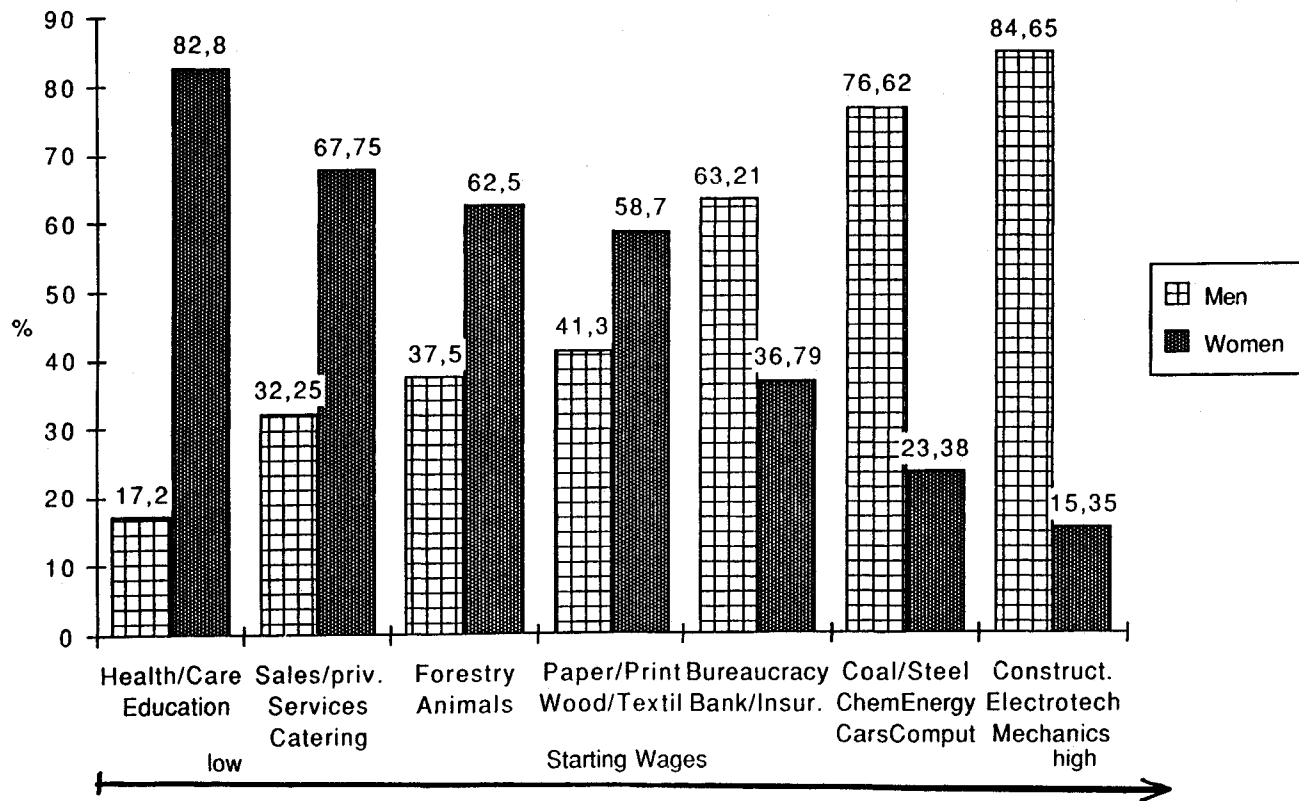
4.3 Wage Change and Job Mobility

Several theories propose hypotheses to explain a change in wages due to job change. Following the tradition of the human capital theory (Becker 1971, Mincer and Polachek 1978, Borjas 1981) suggests two scenarios which can be analyzed in this respect. First, a job change will cause a discontinuity in the earnings history which is to be understood as a change in the level of an earnings profile. Secondly, the age-earnings profile may also continue with a different slope after a job shift occurred.

Structural approaches to the labor market focus on differential mobility patterns in different segments of the labor market (Doeringer and Piore 1971, Dickens and Lang 1988). Internal labor markets will have some kind of barriers to entry, and career advancement varies between segments. While researchers in the human capital tradition assume job shift patterns depend on differences between individuals, the segmented labor market theory assumes, that the structure of the labor market determines job mobility and rewards for job mobility.

Occupational segregation of women in certain occupational and industrial segments will have the consequence, that wage gains due to job mobility between firms will be higher for men. More of the well-paying industries employ quite substantially more men than women. The ratio of male to female employment frequently exceeds 2:1. For these reasons between segment mobility to primary segments is a more likely event for men, and higher wage gains can be obtained by job shifts into certain segments.

A third view based on search theory (McKenna 1985, Hübler 1988, Montgomery 1991) stresses the importance of decisions under uncertainty, which means a firm does not know the true quality of a worker and workers are uncertain whether they have chosen the best paying job available to them. A job change becomes a very likely event in case a person considers his current wage too low relative to other persons with the same age, education, and experience. Persons who enter the labor force for the first time are particularly uncertain about their own abilities, skills, and attainable wages (Viscusi 1983). They are expected to have frequent job changes early in their career. Recent labor market entrants will also have the highest gains to realize due to job shifts, since a mismatch of job and qualification early in a person's career is a more likely event This, to some extent, indicates higher returns to search efforts early in a person's career, and independent of a person's gender.

Differences in job mobility between women and men early in their working life and the impact of these differences on wage gains due to job shifts are hard to predict. However, the work by Huinink (1988) has demonstrated, that taking account of age and education and its delaying effect for the birth of the first and

second child indicates special concerns of women in their search efforts for family considerations in the first few years of their working life.

The human capital theory predicts that a person who changes jobs frequently will have lower wage growth, because a shorter duration in each job gives little chance to acquire additional skills through on-the-job training (Borjas 1981, Bartel and Borjas 1981). Hence a longer duration on the previous job should entail a higher level of earnings in the next job. The theory of segmented labor markets (Dickens and Lang 1988) predicts that wage growth is only associated with job change for those in the primary segment, or changing to this segment. Workers in the secondary segment, who frequently have to change jobs involuntarily, will have no higher wages if they change jobs.

Empirical evidence carried out in several countries to test these hypotheses yielded mixed results. Whilst the dual labor market theory has often been rejected, some form of segmentation of the labor market could be shown. (McNabb and Psacharopoulos 1981, Dickens and Lang 1988, Osberg, Apostle, and Clairmont 1987). For women time spent on the previous job is expected to be of increased importance. Firms might take this information on job tenure as an indicator of job stability, an argument which has often been advanced by proponents of the human capital theory (Becker 1971, Mincer and Ofek 1982)to be a factor that determines the labor earnings of women.

Bartel (1980) analyzed the Coleman- Rossi retrospective life history data. Her results show that education has a positive effect on earnings growth on-the-job, but not on earnings gains if a change of employer occurred. Total earnings gains were highest for persons who changed firms early in their career and whose longest job spell is the current job. The timing of job changes proved to be important in Bartel's study, the earlier in a person's career these job changes took place the higher were their current earnings.

Another study by Borjas (1981) and Bartel and Borjas (1981) based on the National Longitudinal Surveys of young and mature men reports similar to Bartel (1980), that the duration of the job held longest is an important determinant of present earnings, but, and this differs from Bartel's findings, it is not important whether the job held longest occurred at the beginning of a career or at a later stage.

A further hypothesis of the human capital theory predicts that longer interruptions between jobs will decrease the value of any job-specific human capital (Mincer and Ofek 1982). Search-theoretic approaches, which consider either on-the-job or off-the-job search, recognize a positive value in such interruptions between jobs if they are actually used for job search.

Institutional theories of the labor market (Doeringer and Piore 1971) predict an increase in wages if a person changes jobs to a larger firm. Central to this is the ability to pay hypothesis (Bellmann 1986) which states, that the ability and willingness to pay higher wages of employers is higher in times of rising

production and productivity, since profits can be expected to be higher in such periods as well. Any demands for higher wages will be opposed with less vigor than it would otherwise be if the sector of the industry was contracting.

During the 70s the rate of job creation for highly qualified jobs increased much faster in the public sector than in the private sector (Blossfeld and Becker 1989). This led to an upward shift in the hierachically structured career patterns in the public sector during the seventies. This could have caused higher levels of wages in case of job shifts from the private sector to the public sector. Since the public sector is a legally bound equal opportunity employer and traditionally employs many female workers we expect a mobility pattern of more and more women joining the public sector, because of the chance to obtain higher wages for women which are equal to the wages of men in the public sector.

The existence of internal labor markets can be explained by firm-specific selection and training costs, a worker's interest in continuous employment (Blossfeld and Mayer 1988), and an increased level of complex firm-specific organizational structures, which increases the firm's interest in long term employment of its employees.

Macroeconomic indicators will also play some role in the process of job change and wage gains as at entry into the labor force. A higher growth in GNP due to increased productivity enables firms to pay higher wages in prospering sectors. This might have an impact on wages in case of between segment mobility. High rates of unemployment have usually negative effects on changes in the level of wages (Shapiro and Stiglitz 1984). This hypothesis has been confirmed in the analysis of wage gains and job mobility in chapter 3 when analysing men.

To summarize these arguments, job change and earnings growth is less dependent upon individual characteristics, than on the timing when it occurred in an individual's career. It also depends upon the labor market segment a person worked in, and which segment he or she entered.

Findings

We begin with *job changes within firms* in columns 1 and 2 in Table 5. Job changes within employers are more frequent than changes of employer in these data (see also Carroll and Mayer 1986). Furthermore, the respondents are much less likely to recall starting and ending wages for job changes within employers. Because job changes within employers are less common and less often recalled, we believe that these data are less informative than is true for the other dependent variables.

Columns 1 and 2 of Table 5 report the results. Individual characteristics such as age, education, experience, and duration of previous job do not significantly affect men's wage changes due to changes within employers. For women, the

only significant effect of an individual characteristic is movement from first jobs, i.e. transitions from first job produced significantly higher wage gains than subsequent transitions.

The large positive constant for women implies that women gained more than men on average from changing jobs within employers. Yet women were much less likely than men to make such changes, as can be seen by comparing the number of cases. Moreover, the time trend is negative and significant for women. Apparently the few women who made job changes within employers during the 1950s gained substantially but the gains were more moderate in recent years.

For men, the effect of years of education is not significant, supporting the view that education functions as a signal to employers who lack direct information on productivity. Once an individual has worked in an organization, the signal in presumably unimportant, as we find here. On the other hand, for women the effect of education is negative and significant. Women with little education gained most when changing jobs within employers. This result is consistent with the common claim that internal career paths available to women are truncated at the top, that a "glass ceiling" (Hannan, Schoemann, Blossfeld 1990) prevents women from moving into positions with high rewards. Such ceilings on the career paths of women within firms are mostly likely to operate within adiministrative and management tracks, thereby retarding the wage growth of the most highly educated women who presumably enter close to the ceiling.

The four-way partition of labor market segments has a strong impact on men's wage gains from changing jobs within employers. Although employer characteristics like size of workplace would not change, job requirements might. To examine the effects of skill level of the origin job and the destination job, we must consider two interaction effects, size of workplace with origin skill level and size within destination skill level.

According to the main effect of size of workplace, changing jobs within large workplaces does not lead to greater wage gains for men. Although the effect of size of workplace is positive, it is scarcely larger than the standard error. Likewise, the effect of moving from a skilled job (usually to other skilled jobs) is positive and nonsignificant.

Do men gain more when they move from a skilled job within large work organizations, as internal-labor-market theories suggest? The answer is decidedly negative. The interaction effect is negative and significant, and it offsets the positive main effect of moving from a skilled job. These estimates imply a pattern opposite that suggested by internal labor market theory: Men moving from skilled jobs (presumably to other skilled jobs) within small work organizations gain most.

Interestingly, neither the effect of moving into a skilled job nor the interaction of moving into a skilled job while staying in a large workplace is significant for men. According to an internal-labor-market view of job changes between skilled jobs within large organizations, this interaction effect should be positive and large.

Table 5: Estimates of Log-Linear Models of Determinants of Ratios of Starting Wage Rate on Job N + 1 to Finishing Wage on Job N (Standard Errors in Parentheses)

Independent variables	Within firms				Between firms			
	Men		Women		Men		Women	
Intercept	−.067	(.493)	2.59	(1.28)	.469	(.852)	.945	(.702)
Individual characteristics								
Age	.000	(.011)	.005	(.022)	−.017	(.011)	−.008	(.015)
Education	.022	(.028)	−.138*	(.064)	−.023	(.020)	−.056	(.034)
Education * trend	−.002	(.001)	.005	(.003)	.001	(.001)	.002	(.001)
Experience	.0003	(.009)	−.012	(.015)	.009	(.007)	.016	(.011)
First job (Job N)	.079	(.051)	.181**	(.044)	.125**	(.034)	.183**	(.054)
Duration (Job N)	.007	(.013)	.034	(.023)	.007	(.010)	−.014	(.011)
Duration of unemployment					.022	(.015)	.015*	(.007)
Labor market segments								
Public (Job N)	.005	(.036)	−.315**	(.125)	.110	(.084)	−.061	(.069)
Public (Job N + 1)					−.063	(.037)	.105	(.062)
Large firm (Job N)	.119	(.079)	−.354	(.196)	−.218**	(.074)	−.158	(.107)
Large firm (Job N + 1)					.212**	(.045)	.127*	(.061)
Skilled job (Job N)	.207	(.106)	.051	(.160)	−.101*	(.050)	−.114	(.069)
Skilled job (Job N + 1)	−.017	(.082)	−.091	(.155)	.111*	(.046)	.180**	(.069)
Large * skilled (Job N)	−.243*	(.097)	−.064	(.201)	.182**	(.058)	.068	(.105)
Large * skilled (Job N + 1)	.104	(.073)	.331	(.169)	−.156**	(.055)	−.063	(.091)
Primary industries	.515	(.356)	−.371	(.436)				
Small competitive industries	−.272**	(.095)	.091	(.121)				
Competitive craft industries	−.292**	(.080)	.003	(.189)				
Engeneering-based industries	−.252**	(.068)	.220	(.128)				
Professional service industries	−.161	(.112)	.340*	(.154)				
Bueaucratic service industries	−.108	(.086)	.145	(.166)				
Aggregate conditions								
Trend (in years since 1950)	.016	(.014)	−.060**	(.028)	−.019*	(.009)	−.038**	(.014)
Unemployment rate	−.003	(.005)	−.014	(.010)	−.009**	(.003)	.008	(.005)
% change in GNP	.002	(.006)	−.005	(.011)	−.004	(.004)	−.000	(.007)
Probability of inclusion								
λ	.264	(.573)	−1.70	(1.21)	.519	(1.10)	.181	(.638)
Number of cases	359		136		1259		900	
R²	.17		.25		.09		.09	

* p < .05; ** p < .01.

We turn next to the effect of industrial segments. Recall that the excluded category is classical capitalist industries (such as textile manufacturing) in which secondary (unskilled) jobs proliferate. According to segmentation theories, wages for jobs in the classical capitalist sector are inferior to those in most other sectors. Yet the estimates of sectoral effects indicate that average wage gains for men in several sectors are significantly below those of the classical capitalist sector. This is the case for small competitive industries, competitive craft industries, and engineering-based industries. This finding disagrees with segmentation theories: Sectors in which internal careers abound, engineering-based industries, professional service industries, and bureaucratic service industries, have lower average wage gains due to internal job change.

The effects of segmentation for women differ considerably. The four-way partition of the labor market does not explain wage changes due to job changes within employers. Among the six industrial segments, only professional service differs significantly from the classical capitalist sector. While women receive lower than average first wages in this important sector (Table 4), this initial disadvantage can be offset by internal promotion according to these estimates. Such transitions, however, are relatively rare but constitute a possibility to compensate lower starting wages. The evidence for women suggests that job changes within firms are the best way to achieve wage trajectories similar to men.

We now turn to *job changes between firms*. Our previous analysis of wage growth and job change of men in chapter 3 revealed quite surprisingly, that age, education and experience had no significant effect on wages at job shifts between firms. These results are confirmed by our estimates for women of three birth cohorts between 1950 and 1981. This again emphasizes, that education operates largely as a signal to employers, who cannot directly observe a worker's productivity otherwise. The signals are important for men, and even more so for women, to obtain high starting wages in first jobs, but thereafter in case of a job change the signal looses its importance, and is probably replaced by other more direct measures of on-the-job productivity. Support for this view is found in the high and significant effect of the variable indicating job mobility leaving the first job in a person's work history. In this instance women gained on average 20% (exp 0.183), whereas their male counterparts realized only gains of 13% (exp 0.125) as shown in Table 5.

The duration of the previous job has no significant effect on wage gains between firms. The increased probability of human captal accumulation on longer previous jobs shows no significant impact on wage gains in case of a change of employer. However, the time between two jobs, i.e. duration of non-employment, yields a small positive and significant effect for women (exp 0.015 = 1,5%). Women who interrupted their work were able to realize small wage increases at reentry joining another firm. This could be viewed as somehow delayed gainful changes of employer, which may coincide with interruption because of child

births. Women are unlikely to take advantage of job changes which yield very small wage gains for possibly only a short period if they expect to leave the labor force temporarily.

Testing for job characteristics we find, that the classification of jobs into industrial segments does not help to explain the process of wage gains and job shifts. For that reason we do not report these results explicitly. In chapter 3 we found already strong support for segmentation according to size of firm and skill level for men. Applying the same classification to the analysis of women and allowing full interaction indicates, that women gain 13,5% (exp 0.127) in case they take up work in a large firm if they worked in a small firm previously.

Changes from one large employer to another large employer do not pay off, if at all a loss of 3% is incurred by such a move. This might be an indication of employer changes for reasons other than monthly labor earnings. Whilst job shifts between large employers are indifferent for men, women seem to be prepared to accept small losses. At present we can only speculate about possible reasons for this not entirely unexpected result. The distance between home and work, flexible working hours, job shifts because of geographical mobility, probably due to the husbands career changes among others might account for such job changes. Obviously more work needs to be done on this topic to learn more about the process at work.

Substantial premiums of 20% (exp 0.180) are to be reaped if women are able to leave unskilled jobs and work as a skilled person. Even when changing from one skilled job to another skilled job women obtained about 7% (exp 0.180 - 0.114) on top of their finial wage on the last job.

The two interaction effects of large and skilled jobs which were introduced to test for the additivity of the effects of size of firm and skill level and they are both not significant in the analysis of women. We can therefore conclude, that the size and skill effects for women are additive, contrary to the inference one might have made concluding from the analysis of the wage change due to job change of men. Consequently higher gains are made by women if they newly enter an internal labor market (28% for women compared to 18% for men).

Remarkable in this context is the change of the sign of the coefficient on public sector employment, although not significant in both instances. If women who worked in the private sector before then take up employment in the public sector for the first time they had about 10% higher wages after that change. On the contrary men were penalized for shifting to the public sector with a reduction of around 6% (compare findings in chapter 3). This clearly demonstrates some non-discriminatory behavior of public sector employers, and the view is supported by the finding, that once a person regardless of gender has been employed in the public sector before and changes to an other employer also in the public sector, both women and men have the same small top up on their wage.

A job change which occurred later during the period of 1950 and 1981 yielded significantly lower wage gains for men and women, whilst the negative effect for women is also twice as high as the one for men. This "historical effect" may be explained by higher frequencies of job shift rates in later years with smaller increments, but not with shortages of labor supply or reduced growth rates for the whole economy. For men percentage changes in the national rate of unemployment had a significant negative effect on wage gains no such effect is found for women in the post-war period in case they changed jobs between firms.

4.4 Wage Growth within Jobs

We now turn our attention to the process of wage growth within jobs. In shifting to this topic, we move from consideration of static questions about point-in-time events to dynamic questions about processes that unfold over time. While there is some disagreement between theories about how wage growth rates change over time, gender differences of wage growth rates have not been addressed in the empirical literature on the subject at all.

To explain wage growth over time on the same job we can make use of two hypotheses. Mincer's (1974) extension of the human capital approach claims that in continuous employment work experience should pay off besides the effect of educational qualifications. In Mincer's view a longer duration on the job is regarded as accumulation of individual human capital on that job. A consequence of increased productivity due to job experience will be that earnings should grow accordingly. Growth rates of earnings will initially grow faster as experience increases quickly. However, increments of earnings will grow at a lower rate as there is less additional experience to be gained later on the job.

Blossfeld (1985) has already demonstrated that in the immediate post-war years women had on average spent less years in full-time education than men, however these differences in education have narrowed a great deal since then. Comparing the absolute number of years in full time education there is hardly any difference any more in the figures for women and men, but there is still a sizable difference in the women to men ratio in certain subjects and occupations. From this it can be expected that the returns to education are higher for women than for men, since fewer women held higher degrees during most of the years covered by the German Life History Survey. At least this can be concluded from some studies on male-female wage differentials (Helberger 1983, Gerlach and Hübler 1985).

On the basis of the shirking theory (Akerlof 1982) it is equally possible to argue that with increasing duration on the same job a worker will receive a steadily increasing wage (Bellmann 1986). The idea behind this statement is that in many jobs the required amount of work is hard to describe in labor contracts.

Therefore, there may be an incentive to shirk, or at least a possibility to shirk. A firm will organize its wage structure so that workers who have been found out shirking suffer a substantial loss in earnings, or loose their job. Lazear and Rosen (1981) gave an example of what such a wage structure could be like. If an employee is paid below his marginal product of labor during the first few years on the job, he accumulates a bond which is paid back on top of his usual wage later. Older workers therefore will have higher wages than younger workers, although there might be no difference in productivity. The increasing slope of an age-earnings profile provides not only an incentive to work harder, but workers who have been caught shirking suffer a higher loss. Hence, the penalty for shirking is increased.

If labor earnings were organized as the shirking theory views them, this would mean, that women who interrupted their working career and start another job after this interruption would not only have lost the previous bond they paid to their previous employer, but would also have to pay another bond to the new employer. Hence, women suffer a twofold disadvantage in case they quit a job. A possible consequence of this is, that women would tend to avoid such jobs were they initially earn less than their marginal product if they themselves consider it a likely event to interrupt their work for a few months or years.

Besides these hypotheses of the determinants of the growth in wages on the same job due to individual characteristics other factors also affect wage growth on the job. These job characteristics are firm size and skill level, or industrial segments.

We also expect macroeconomic forces to play a role in wage growth. In particular, following the argument by Shapiro and Stiglitz (1984), a high rate of unemployment has a negative impact on the level of wages. This can be explained out of the fact that high rates of unemployment operate as a worker discipline device, which somehow increases the costs of an employee if he is dismissed because of shirking, since the probability to find another job is reduced.

Findings

Before analysing differential effects of individual characteristics and aggregate conditions on labor earnings of women and men, we want to focus on the dynamic aspects of the model. The effect of duration is estimated by two variables. The first one, the initial growth rate, is to be unterstood as instantaneous growth of earnings which starts with the first day a worker takes up employment. This can also be regarded as the initial steepness of the age-earnings profil. The second variable in the model the rate of decline then tells more about the shape of the profil as time evolves.

Our results of the dynamic shape of labor earnings show, that the initial growth rate for women is nearly twice as high as the one for men (0.1209

compared to 0.065), but the rate of decline is also twice as high for women (compare Table 6). In other words, women have at the beginning of a job on average higher wages than men, but on-the-job wage growth is twice as rapid for men than for women. The longer women stay with the same employer the more they fall behind in terms of wages. Jobs which follow a certain career trajectory and offer steep age-earnings profiles must have been almost unavailable to women.

One explanation for this result could be, that individual characteristics, individual preferences, or differences in education or experience are largely different. However, our estimates reveal another striking result. Education and experience have no significant effect on wage growth within jobs for women in the post-war period. Whereas educational qualifications are rewarded for men not only at the beginning of their career, but also on-the-job. No such effects are found for women.

Table 6: Estimates of Stochastic Differential Equation Model of Wage Rate Growth Within Jobs (Standard Errors in Parentheses)

Independent variables	Model			
	Men		Women	
Intercept ($1/\sqrt{Dur}$)	.246**	(.063)	.012*	(.006)
Dynamics				
Individual groth rate ($\sqrt{Dur}$)	.072**	(.015)	.118**	(.0038)
Rate of decline ($Dur^{3/2}$)	−.0011**	(.0003)	−.0018**	(.0004)
Individual characteristics[+]				
Age	−.0015	(.0008)	−.0011	(.0093)
Education	.0020*	(.0009)	.0012	(.0014)
Experience	.0008	(.0008)	.0001	(.0009)
First job	.048**	(.007)	.041**	(.008)
First job * $Dur^{3/2}$	−.0013**	(.0004)	−.0017**	(.0006)
Aggregate conditions[+]				
Time trend	−.0020**	(.0003)	−.0027**	(.0004)
Unemployment rate	−.0007	(.0004)	−.0012**	(.0004)
% change in GNP	−.0006	(.0006)	−.0011	(.0007)
Probability of inclusion				
λ	−.284**	(.086)	−.018	(.034)
Number of cases	2541		1977	
R^2	.221		.277	

* $p < .05$; ** $p < .01$.
[+] Covariate are multipled by $\sqrt{Dur}$ (see text).

As in our previous analyses of starting wages and wage change due to job mobility we estimated the model in Table 6 including dummy variables for skill level, size of firm, and industrial segments. None of these variables individually had a significant effect on wage growth within jobs, nor did these models improve the fit of the simple model reported in Table 6. In order to save space we do not report these results in this paper. Since there are no significant differences between industrial segments, or internal and external labour markets, the result of an insignificant effect of education for women is even more surprising. There exists no such thing as a "good" labor market segment or segments for women where their growth in wages would follow the same track as the wages of men.

The same interpretation of results is suggested by the coefficient on first job. Although we have shown in the analysis of starting wages, that women have on average higher starting wages than men, the dynamic analysis demonstrates men have right from the beginning of a job higher wage growth. With each additional year on the first job the gap between wage growth for men and women begins to widen. For second jobs, or any consecutive job the gap widens even more.

Aggregate conditions have also been unfavorable to women. The negative and significant effect of time trend means, that wage growth rates have slowed down faster for women than for men. Of the macroeconomic indicators only the unemployment rate and, again, only for women has a negative and significant effect. The higher the general rate of unemployment is, the smaller is the wage growth rate for women. Here we find another important difference between growth rates of women and men. A lack of demand on the labor market has direct effects on wages of women. If there is any effect at all on men's wages the effect will be considerably smaller.

Finally, the correction we introduced for possible bias due to recall errors is not significant for women and the overall fit of the modell is also better in the modell for women despite the fact that these models are still oriented more towards the analysis of men than women. More refined models including more information on family circumstances, social background and regional differences had to be referred to a later point in time.

4.5. Discussion

Subject of this chapter is to analyze in a comparative-analytic manner three processes of the development of labor earnings of women and men in the postwar years in the West German labor market. What has been named an economic miracle during the 50s and 60s appears to have been largely to the benefit of German men in the West German labor market.

Despite an equalization of educational attainment during that period, educational qualifications of women are rewarded only to obtain their first job, and these rewards of higher education have also come down by almost 50% in recent years. At the beginning of a career the inequality of labor earnings due to educational differences is much larger between women than between men. Those women with high education do fairly well when compared to women with no qualifications. However, when a comparison with men is taken in a dynamic setting we observe, that higher education has not helped women to obtain high rates of wage growth within jobs. Men and women appear to be on different career ladders, since wage growth within jobs rewards educational qualifications of men but not of women. These differences exist right from the first job a person holds, and increases with consecutive jobs.

Since education has no significant effect on wage growth for women a screening interpretation of the effect of education on first wages becomes more plausible. Education as a screening device operates for allocation to first jobs but once employers have more direct information on observed productivity on the job the screening device is seemingly replaced with other direct measures of productivity which determine wage growth on the job.

In analysing the effects of occupational segregation and industrial segmentation we employed two different kinds of approaches with mixed success. Competitive craft industries and engineering-based industries which are the best paying industires for men do not pay above average wages to women on first jobs. However, we find that primary and professional service industries pay women significantly less in first jobs. Whilst there is evidence for segmented starting wages on first jobs, and at the process of changing jobs wage growth on the job does not show differential growth according to labor market segments. Women have to accept additional disadvantages on top of adverse effects due to labor market segmentation because they are crowded in occupations which are overly represented in disadvantaged labor market segments. Our results suggest that labor market segmentation is the overriding process supporting the hypothesis formulated in section 2.9.3 on gender issues.

As in the analysis of men we now find that industrial segments do not play a role in wage gains due to job change. Segmentation according to skill level and size of firms shows, that these two factors are also important to women if they change jobs. Women can gain above average wage rates if they change jobs to

a big firm, or work as a skilled person, in particular leaving unskilled jobs. Since education, experience and duration of the previous job do not play a role in this process of job change, it might be possible that women worked in jobs which did not reward their previously obtained skills accordingly. Recent evidence found by Perry (1988) on downward occupational mobility and part-time women workers, and these job spells are excluded from our analysis, can give some indication why individual characteristics of women do not affect wage gains at job change, but skill level of the job does. In any case, there is segmentation of labor markets for women following the lines of size of employer and skill level which is important in the process of job shifts.

We find no evidence of segmentation for the process of wage growth within jobs. Women have in no industrial segment particulary bad wage growth, but there are also no segments of the labor market which offer higher wage growth rates to either women or men. Internal labor markets and employment in the public sector, which we especially included because of its dominant role as employer of highly educated persons, do not provide higher wage growth rates between 1950 and 1981.

Yearly rates of aggregate unemployment proved to be of some importance. Aggregate unemployment as a worker discipline device reduces wage gains when men change jobs between employers and reduces wage growth for women when staying on the job. These results suggest that it is important to include macro-economic influences and societal perceptions about the tightness of the labor market into individual earnings functions, but the national rate of unemployment for men and women might be too general or too aggregated in its form to show more explicit results in other processes. In effect it could well be local unemployment rates separated for women and men that are the better indicators of a worker's perception of the probability of him becoming unemployed.

Finally, the anti-discrimination laws do not show significant effects on wage growth rates within jobs for women even if they are employed in the public sector. Researchers of the human capital tradition will need to find other explanations why education pays off only for men and not for women in the long run. Occupational segregation is only to a minor extent responsible for this finding. The search-theoretic explanation of industry differentials in wages Montgomery (1991) did not help us to explain the results of industry differences in wages between men and women which questions the generality of the proposed theory.

Concerning the broader hypotheses of the importance to apply a life course perspective to the analysis of wage trajectories we have collected additional evidence in this chapter of male and female wage trajectories that such a perspective yields new insights which would not have been found if we had not differentiated the three processes as a kind of structure of the life course. In all instances the explained variance in models for women is higher than the one for

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men indicating that differentiating these processes is even more useful in the analysis of wage trajectories of women. The process of wage attainment at entry into the labor market is crucial in determining wage trajectories even at later stages during the life course since wage growth on the first job is also the highest compared to later jobs for both men and women.

The time trend component in the process of wage attainment over the life course has, to our knowledge, been neglected in most empirical analyses of wage attainment. Over time these processes change due to changing structures of the life course initiated by size of birth cohorts, size of cohorts of labor market entrants holding subsequently higher educational credentials, but also processes of modernization and technological innovation which change both the occupational structure and the process of wage attainment. So far we have only been able to demonstrate the importance to single out the effects of the time trend without being able to capture with more precision the various dimensions of the "vector of social change". With low probability of misinterpretation we can conclude from our analysis in this chapter that the vector of social change during the post-war years has not worked much in the direction to equalize the earnings trajectories of women and men despite a narrowing of the gap in differences of educational attainment.

5. The Dynamics of Labor Earnings in Poland from a Comparative Perspective

5.1 Introduction

As in the previous chapter three and four we continue the empirical verification of sociological and economic labor market theories with respect to the interrelationship of earnings and education. In this chapter we want to widen the possibility of testing labor market theories by assuming, that independent of the level of economic development, and in spite of a different mix of centralized and decentralized decision making, processes in labor markets show a considerable amount of similarity.

Following the practice of the other chapters to apply a life course perspective to the process of wage attainment we distinguish three basic processes. The components are (1) wage rates at time of first entry into the labor market, (2) relative wage changes at times of job changes, either with the same employer or to a new employer, and (3) growth in wages over job durations. The reason for this separation of processes is based on the idea, that each of these processes is substantively different from the others.

Factors influencing wages at entry into the labor force are different from factors influencing job mobility within or between employers as we have demonstrated in the previous chapters. The dynamics of wage growth on the job are a recent extension to the repertoire of models to analyze dynamic labor market events introduced as statistical methodology for the social sciences by Tuma and Hannan (1984) to study social dynamics. An empirical application of such a model is presented in chapter three and four.

It could be questioned, whether it is advisable to make the same distinction into three processes as a basic structure of the life course when analysing a centrally planned economy, a society with proclaimed more egalitarian structure in the process of wage attainment. We set out to test just this assumption by applying the same division of wage attainment processes to a society with proposed different social principals, which also figures on a different level of economic development. This attempt might fill the categoric definition of differences between societies with more substantive content and might yield a measure of degrees of differences.

Cross- national comparisons of occupational mobility have been intrigued by the difficulty to find significant differences in mobility patterns between countries, once exogenous structural differences have been accounted for (Wong 1990). We attempt to overcome this defizit and pursue a comparative analysis following the comparative method proposed by McMichael (1990), called incorporated comparisons. Incorporated comparisons aim at progressively constructing a whole via putting historical phenomena into context. Our attempt is to substantiate a historical process of wage attainment through comparison of its components.

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Historically incorporated comparisons allow generalization of processes. Contrary to the comparative- analytic method we no longer attempt to abstract processes from their settings in time and place, nor do we try to differentiate in general or particular instances of the wage attainment process. The comparison itself is an integral part of the inquiry, which will link apparently distinct processes in and across time and space as components of a wider historical and/or worldwide process.

McMichael's (1990) theory of incorporated comparisons notes, that in history there are divergent manifestations of a singular process. Accordingly we attempt to contribute to a historically grounded model of wage attainment through the comparative juxtaposition of elements of a dynamic self- forming whole. McMichael's terminolgy of the dynamic self- forming whole appears especially suited to describe the self- forming European or Central European labor market constituting some kind of an entity, which certainly features interesting dynamics.

5.2 Labor Market Theories and Policies in Historical Context

One of the interests of this chapter is to study the relevance of labor market theories to countries based on more central planning. In adding more historical content to labor market theories and making comparisons an integral part of the analysis we consider it feasable to apply models developed against the background of a market economy to countries with different political and economic systems to arrive at the identification of what we call a historical process. Many studies already emphasized the importance of the education system with respect to economic development and structural change. A high general level of education is frequently regarded as a precondition to facilitate economic and social reforms. We want to shed some light on the importance of education in this general process of development by focusing on the issue to what extent educational qualifications can explain differences in labor earnings among Polish as compared to West German men in the post- war period.

For all birth cohorts under consideration we study a time period of high occupational mobility out of jobs in agriculture. In Poland in 1947 the agricultural sector accounted for 56% of the total national income and more than 50% of the labor force worked in agriculture. The share of the labor force in agriculture decreased rapidly in the post- war period from 48% in 1960 to 39% in 1970. Today this share is just below 30%. Comparable figures for West Germany show a decline of the labor force in agriculture from about 25% in 1947 to 5% in 1980. In West Germany the contribution of the agricultural sector to the national income decreased from 5,8% in 1960 to 2,2% in 1980.

This kind of economic development poses a formidable challenge to the education system in order to train and retrain manpower leaving the agricultural sector, and to prepare the workforce for the increased speed of technological innovation in all sectors of the economy. The task of the education system in this process is to provide the whole labor force, or at least the new labor market entrants, with relevant skills and qualifications.

Geographical mobility plays also an nonnegligible role in this process of economic development. Interregional migration to new centers of industrial growth in the immediate post- war years has certainly reinforced the leading role of key industrial sectors for economic growth. Migration from rural- to urban areas is another social phenomenon contributing to higher economic growth. In this chapter, however, we have to abstract from these potential influences. The information, that on the aggregate level both in West Germany and in Poland the speed of this process has been of similar magnitude between 1960 and 1980 allows us to omit closer scrutiny of the impact of interregional job mobility on labor earnings. The urban population as a percentage of the total population increased by about 8 percentage points in both countries, although both countries figure on different levels of urbanization.

Beginning with the late fourties a policy of full employment was introduced in Poland. This helped to lower high unemployment rates during the post- war years. In our analysis using longitudinal data of the micro- and macro- level, we can analyse the effects of such a labor market policy on the wage structure during consecutive years. In West Germany no such policy was formulated, if we do not consider the model of the "social market economy" as containing some form of such a labor market policy. Fast economic growth stimulated by the Marshall Plan and the process of Western European integration helped to overcome the years with high unemployment in the early years of West Germany.

The Polish policy of full employment must have had its effect on the wage structure via the emphasis it puts on providing jobs for all those eligible for work or actively looking for a job. Productivity considerations; either at the micro- or the macro- level, are no longer considered to be of utmost importance. A worker's productivity, which might be highly correlated with his level of general education, is assumed to be of secondary importance.

This kind of underlying principle, who benefits from increased productivity, should create a different wage structure within a society. A consequence of this might be, that the wage structure itself will no longer set incentives to individual workers to chose beween jobs, professions, industries, or careers. Other mechanisms will have to fill this gap. The central plan needs to set guiding principles on the macro level, and another incentive structure has to replace or supplement the wage structure on the micro level.

A bonus system had been introduced to fill this gap. Its function is to guide individual decision making and provide additional work incentives. The basic structure of such a reward system is described by Cave and Hare (1980). Such a system is commonly applied to the higher professional groups with some managerial responsibilities. Bonuses are defined in relation to the target set in the Central Plan. An overachievement of the target will result in the payment of a bonus on top of the salary, usually in form of a lump sum payment. Since we cannot verify any derived hypotheses due to lack of data on the firm level we do not develop these issues further in this context.

The major characteristic of the Polish education system of the first post- war decade (1945-1955) was the effort to achieve universal primary education and to facilitate access to grammar schools and universities. Compulsory education embraced the completion of 7 years of primary education usually starting at age 7. In 1961 the system was extended by one year to 8 years of compulsory education.

A further extension of the duration of general education to 10 years was decided in 1973 in line with an upgrading of teacher qualifications. However, Mokrzecki (1990) mentions, that this policy remained a proclaimed aim, which, because of economic difficulties, could not be implemented. In West Germany we observe a similar extension of the duration of compulsory education mainly embracing secondary education.

Both in Poland and West Germany the education system incorporates a well developed and structured vocational training system, which in both countries takes between 2 and 4 years to complete depending on the technical direction chosen. In 1981 almost three quarters of all school leavers in Poland had chosen junior, or secondary, vocational training. The corresponding figure for West Germany is similarly high at about two thirds.

Third level education has seen the most dramatic changes in both countries. Between 1950 and 1980 the absolute numbers of students enrolled in universities increased 5-fold in Poland and almost ten-fold in West Germany. Poland saw student numbers increase from 118000 in 1950 to almost 600000 in 1980. West Germany registered a surge from 135000 students to 1,2 million in the same time period 1950 to 1980. Such sizable changes in absolute numbers will have some impact on the returns to education if the opportunity structure faced by new labor market entrants does not change as rapid as absolute numbers of university students.

The analysis by Blossfeld and Szambelanczyk (1989) compared the opportunity structure of West Germany and Poland. For new labor market entrants they show a shift in the occupational structure in Poland towards a stage of advanced industrialization. They denote job changes in West Germany as resemblance of a transition to a postindustrial stage, which they describe as the state, when younger birth cohorts face new employment opportunity structures,

such as a lower share of the labor force working in traditional industries. When analysing cohort career mobility Blossfeld and Szambelanczyk (1989) report, that in the Polish labor market reaching managerial positions depends mainly on labor market experience, rather than particularly high educational credentials.

Kluczynski and Sanyal (1985) focus on a different characteristic of Polish workers in order to understand career mobility in Poland. They mention surplus qualifications as a fundamental precondition within the planning philosophy. The education system favoured training for a number of professional activities rather than just training for one job. Hence, if wages are attributed to jobs, or job characteristics, we might find rather poor personal returns to general education in comparison with West Germany, since jobs in Poland are filled with persons who possess surplus qualifications. Such surplus qualifications equally qualify them for another professional job and facilitate job mobility within or between public and private sector employment. Such job mobility or professional status changes into self employment are a very recent example which might also be due to the phenomenon of overqualification, or qualifications for more than one occupation.

This also leads us to expect higher job turnover rates in Poland than in West Germany. Different educational requirements of another job should constitute lower barriers to job mobility for workers wanting to change jobs.

Wong (1990) carried out a cross- national comparison of occupational mobility which differentiates two dichotomies, the degree of economic development and the organizing principle in economic production. His assessment of theoretical positions derived from these dichotomies does not yield a clear prediction in which kind of society "a priori" mobility rates should be higher. His results do not show sufficient evidence to support the commonly stated hypothesis, that socialist societies offer better chances of job mobility than capitalist societies.

Lulek and Paga (1989) outlined why it makes sense to study topics of inequality in centrally planned economies. The notion of inequality is seen against a much wider background of various spheres of inequality, such as private ownership, access to commodities and services, equality of opportunities, and a rather strict division into decision makers and decision takers.

According to Lulek and Paga (1989) we might find, that the highest earnings may not be found within the industrial sector of the economy, but within households, whose members have some sort of political power, for example, people with jobs in defence, the police, secret services, or the party apparatus. Another group of people, who are expected to have above average earnings are representatives of private initiatives like handicraft, commerce, and services.

Since access to commodities is not guaranteed for people with high earnings the access to and possession of durable commodities is a substantial part of a person's wealth. In order to stress the importance of this particular point, we refer to Lulek and Paga (1989) who mention the paradox, that the households best

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supplied with durable commodities are most frequently those who do not have high incomes out of labor earnings. Prices of such commodities have reached such high levels, that even the highest earnings cannot pay for them. Other non-wage components of income play a much stronger role in Poland than in any West European country.

Concluding from work by Smulska (1986) and Lulek and Paga (1989) the following sources of high levels of durable assets are found in Polish households: privileged access to durables (rebates), grey or black market activities, earnings from employment abroad, and accumulation of assets in consecutive family generations.

Hence, the conclusion to be drawn from this is, that labor earnings provide only for the most basic "day-to-day" needs, and even high savings out of labor earnings do not allow to buy many durable assets. These arguments stress the lower importance of labor earnings both on the micro level for each individual, as well as from the societal point of view of socialist ideology.

If higher investment in education, by means of direct costs and foregone earnings, justifies higher earnings to recover the investment costs, then we should expect, that the low importance of labor earnings (to achieve a higher living standard) will not encourage high investment in education. Put differently, for those, who have invested heavily in education the returns to education in terms of labor earnings will be smaller than in West Germany. As compared to Poland we can therefore expect higher levels of education to receive higher rewards in monetary terms in West Germany. The closer link of labor earnings and individual material welfare in West Germany leads us to expect a higher correlation of educational efforts, or investment, and labor earnings.

After the comparison of unemployment, education, and labor market policies, each of them against the historical and societal background, we review the previous approach by Domanski (1988) to investigate issues related to labor market segmentation in Polish society. Of the many different conceptualizations that have been proposed to analyze labor market segmentation in Western societies Domanski retains the idea, that certain employers try to encourage greater employment stability by licensing practices, special job reward systems, or other institutional arrangements. He argues further, that worker bargaining power is of little relevance to the labor market in Poland. The law to work and the secondary importance of economic efficiency to Polish managerial staff render other origins of labor market segmentation unlikely.

The origin of Polish labor market segmentation is more likely due to an overly bureaucratic system of central planning. The administration of the Central Plan determines, which industries will obtain more raw materials, investment, and other resources. Simarly, the degree of monopolization, and the concentration of employment in certain industries, which is comparable to Stinchcombe's model (1979) of segmentation in Western societies, leads to an institutionally

superimposed division. These principles of industrial organization, which can be denoted as degree of monopolization, concentration, and firm size, will also have an impact on the process of wage attainment at various stages throughout a person's employment history.

The evidence provided by Domanski (1988), which is based on cross-sectional analysis, supports this view of labor market segmentation as highly relevant to the Polish society in 1982. Two industries, mining and construction, arise as industries with key roles in the economic development of Poland, and workers in these industries received the highest labor earnings after accounting for other worker characteristics such as age and education.

5.3 Data and Measurement

In both the German Life History Study (Mayer and Brückner 1989) of birth cohorts born between 1929-31, 1939-41, and 1949-51 and in the Polish Study of Social Mobility (Pohoski 1976) using the birth cohort 1939-41, we have chosen to restrict our analysis to data for men only. In order to reduce the complexity of the incorporated country comparison we abstract from the vast issue of sex differences within countries, their changes over time, and between country comparisons of the processes at work.

The straightforward comparison of national female labor force participation rates reveals, that there is a lot of additional variance in basic variables like labor force participation to be explained when constructing models of income determination for women in the two countries. Poland has seen considerable increases in the share of women joining the labor force. The rise from 40% in 1960 to 46% in 1970 and almost 50% in 1980 is high in comparison to the stable rate of female labor force participation in West Germany of about 33% in 1960 and in 1980.

High crude birth rates during the baby boom years in West Germany of 16 in 1968 just match the rate for Poland in the same year. A decline in this rate to 9 in 1978 and 10 in 1988 in West Germany, and the rates of 19 in 1978 and 16 in 1988 show an additional dimension to be studied when analysing female wage attainment in the two countries. Heckman and Walker (1990) approach such issues using Swedish longitudinal data, but cross- country comparisons introduce still further complexities due to abundant sources of both observed and unobserved heterogeneity within samples and their consequences for a well specified country model.

Since we report the same models and results for as in chapter 3 we will be brief in the description of the West German data, but more specific on the Polish data collected under the direction of Pohoski (1976) and shall focus on differences between the two data sets and consequences for the comparative analysis.

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The German Life History Study (Mayer and Brückner 1989) records net monthly earnings at the beginning and end of each job in a person's employment history. These earnings data were then divided by the average hours worked to obtain hourly wages rates. To ensure intertemporal comparability we deflated the net hourly wage rate to account for increases in labor earnings due to increases in the cost of living.

The Polish data (Pohoski 1976) contain very detailed information of various components of wages. The total monthly wage is recorded at the beginning and end of each job spell. This total monthly wage is a composition of the basic wage and monthly bonuses all recorded at beginning and end of each job. In our analysis we make use of the total monthly wage, since we are also interested in industry differences of total wages, and bonuses (Leistungsprämien, Deputat, Belohnungen) were the most frequently used way in Polish society to top up basic salaries. Similar to the German data we calculate an hourly wage rate and account for inflationary increases in wages.

An inspection of differences in basic and total salaries revealed only small differences in the two earnings measures so that using total or basic earnings as earnings measure is not expected to have a major impact on our results. The use of official inflation figures in a centrally planned economy bears some difficulties, but since we are dealing with inflation figures prior to the first oil- shock in 1973 the differences to "true values" are considered to be of minor importance.

As independent variables in the two countries we include age, labor force experience, education and two measures of labor market segmentation. Age and labor force experience are both calculated in years and job experience starts at the time of first entry into the labor force. In the Polish data this means, that for the birth cohort born between 1939-41 school entry had been between around 1946-48 and labor force participation could have started the earliest 7 years later between 1953-55. For those with secondary school education, which takes another 4 years to complete entry into the labor market occurs around 1960. The analysis of wage trajectories is thus limited to a maximum of about 10 years of labor force participation for people having completed secondary education, and about five years for university graduates, due to censoring by the date of the interview in the year 1972 in this data set.

Education in Poland and West Germany has a specific common feature. Both education systems, for many years now, offer a system of well established vocational training courses either in form of the dual system, partly in school and partly in the enterprise, or consisting of full time training in technical or vocational colleges with an average duration of training of about 2 years during the time period under consideration.

The measure of education chosen for the analysis of West German men in chapter three and the comparison with women in chapter four has immediate practical advantages for our cross- national comparison in this chapter. Whereas

reflecting the education system with a number of dummy variables might enhance the precision to test very specific hypotheses about certain qualifications the measure of education as average duration to complete a course makes it easier to quantify cross- country differences.

Qualitative aspects of courses and their differences between countries are not testable using our approach. Since we do not have data on, for example, fields of study for university students within countries, we need to abstract from these possible qualitative sources of differential returns to education or the different screening value of an educational credential.

For West Germany the duration of general education ranges from a minimum of 9 years to 19 years for those who complete a master's degree at university. In Poland the same education variable ranges from 8 to 18 years duration to obtain certain education certificates.

Accurate measurement of labor market segmentation is still a highly debated issue. In previous work with the German data we found, that approaches, which reflect opportunity structures or constraints in labor market segments, fared best under empirical scrutiny (Carroll and Mayer 1986, Blossfeld and Mayer 1989, Hannan, Schoemann, Blossfeld 1990). The results show in chapter three and four equally indicate such an approach.

Our first operationalization refers back to previous research by Lutz and Sengenberger (1974). Characteristics of jobs and workplaces are used to distinguish four labor market segments: (1) Internal labor markets (2) craft- like jobs (3) mass production jobs, and (4) peripheral jobs. The representation of these segments is achieved by classifying jobs into skilled versus unskilled jobs and jobs in small firms versus jobs in large firms. The interaction of the two variables describes internal labor markets usually to be found in large firms, which are at the same time requiring high skill levels.

The well developed vocational training system in both countries allows us to assume, that similar axes of segmentation might be present in Poland and West Germany. Most skills are acquired through the vocational training system and many of those before first entry into the labor market. They facilitate job mobility of skilled workers in small work organizations since skilled workers do not loose their skill level due to a change of employer. In large work organizations, however, skills are more likely to be firm- specific, and therefore not easily transferable between large organizations. Because of the centralized structure of the Polish economy and the institutionalized construction of combinations of firms to "Kombinate" we were obliged to change the definition of the dummy variable to identify large firms in Poland to be those with more than 100 employees (50 in West Germany).

Our second way to measure effects of labor market segmentation on labor earnings follows Stinchcombe (1979) and the application of this coding scheme to the West German data by Carroll and Mayer (1986). Justifications why and

how this kind of industry classification is applicable to West Germany are well explained in both chapter three and chapter four of the dissertation, but a transfer to the Polish economy has not been envisaged in the original construction of this industry classification.

Stinchcombe (1979) distinguishes industries with monopoly power in product markets, because of technical constraints, or institutional regulations from those industries which operate in competitive markets. Additionally skill levels, property rights and unionization of the work force are employed to further identify industries offering differential rewards. Chapter four shows that this classification scheme transferred to the West German labor market yields a useful measure to also distinguish male and female employment and differences in rewards between industries.

The historical dimension of industrial development is of particular interest in our attempt to carry out an incorporated comparison between an economy based on centralized planning and one with more decentralized decision making. A historically embedded construction of an industry classification can better reflect the labor relations, reward schemes, and bargaining positions due to historical labor supply and demand circumstances.

The two industry classifications we apply in Poland and West Germany aim to capture this dimension of post second world war industrial development and its implications for the development of labor markets, labor relations, and job rewards. Due to the differential speed of industrialization, or tertiarization, in the two countries some sectors are expected to offer superior rewards supported by their rapid expansion or large share in the total gross national product during certain periods.

West Germany's industrial development and its effect on workers' wage attainment can be described differentiating 7 industrial segments: (1) traditional primary industries, (2) small competitive industries, (3) classical capitalist industries, (4) competitive industries, (5) large- scale engineering- based industries, (6) professional service industries, and (7) bureaucratic service industries. Section 2.4 in chapter two gives a more explicit description of these segments and the theoretical perspective as it was developed by Stinchcombe (1979). In section 3.2 we describe the operationalization for West Germany in more detail.

Since the 1950s industrial development in West Germany is characterized by a continued sharp decrease in the importance of the agricultural sector, or traditional primary industries as a whole. This decline is reflected both in time series on the percentage share of the labor force working in this industrial segment, as well as the percentage share of this industrial segment in gnp. Markets for products in this sector have become increasingly competitive on the international level and rewards to unskilled and skilled workers did not have much scope for substantial increases. The inexistence of labor unions in those

rurally based firms, or family enterprises, is an additional characteristic of this segment in West Germany.

Traditional primary industries in Poland also declined in terms of share of the labor force and percentage share of total gnp. However, the difference of private initiatives and state run agricultural firms must have had its influence on wages. Since workers in the state sector of primary industries are much better protected against losses in wages we should not find substantial differences for these workers' wages in all 3 processes in comparison with other industrial segments.

The years between 1950 and the first oil- crisis have seen the remarkable rise of large- scale engineering- based industries in Poland and West Germany. As these sectors with fast economic development expanded their share in gnp and also their share of the total labor force they offered higher wages to attract skilled labor necessary to operate the capital intensive machinery. High labor productivity and high unionization pushed up workers' wages faster than in most other sectors. For Poland Domanski (1988) reports a continued labor shortage in these kinds of industries. In West Germany this sector of the economy set for many years signals to all other industries concerning percentage wage increases agreed upon in the trade union - employer wage bargaining procedure.

In West Germany this labor market segment includes the coal and steel industry, chemical and car industries, and the large scale energy sector. In Poland we decided to include more than one dummy for these industries, since industrial segmentation will probably be different due to the central definition of priorities and resources for industries. We identify one labor market segment according to the predominant role of the mining and steel industries in the central plan. Chemical industries and the energy sector were also separated into one segment due to lower importance attached to these industries during the 50s and 60s. Machinery, tools, and the car producing industries are separated into another less favoured industry.

Competitive craft industries operating under price competition for their output and relying predominantly on skilled labor have been of particular importance in the years of immediate post war reconstruction, construction of large- scale engineering facilities, the process of urbanization, and in improving housing and educational capacities. Persistent high demand for skilled workers needs to keep wages at high levels in this industrial segment to ensure recruitment of sufficiently high numbers of workers into this segment. We expect to find little differences between the countries for wages at entry and changes within or between employers in key industries of economic development after the second world war.

In West Germany this segment inlcudes construction, electrotechnical, and mechanical engineering. For the Polish data we preferred to split up this segment into its industry components emphasizing the importance of the role attached to an industry in the Central Plan and its consequence for superior remuneration of employees.

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Bureaucratic service industries in both countries include the administrative sector, the civil service, as well as banking and insurance. The segment of professional service industries is also defined in an identical way combining mainly the health and education sector in each country.

Both data sets contain a variable called trend which accounts for secular trends in wages and the historical context at the time of the beginning of each job. It measures time elasped in years since 1950 to incorporate in a general or rudimentary way other quantitative influences on net hourly wages, probably factors like the reduction in weekly working hours over decades. In the West German data this variable is somehow absorbing the weak and insignificant effect of the dummies for the three birth cohorts which we used in our first estimates with this data set (Blossfeld, Hannan, Schoemann 1989).

The interaction of this time trend with education measured in years of duration to obtain a certain education certificate proved of particular importance to obtain stable estimates in analyses of the West German data as shown in chapters 3 and 4 of the thesis. The analysis in the appendix on the reliability of estimates suggests that this variable is close to the direct measurement of the size of university student cohorts and the influence of increasing supply of highly qualified individuals to the labor market.

In both data we included macroeconomic conditions reflecting increases in productivity on the national level, but for Poland we do not expect to find sizable effects of these macroeconomic variables based on official data, since there are considerable difficulties in measurement of these data for the time period under investigation. In socialist countries there is an even more indirect way of influences of macroeconomic determinants on individual level wages due to political doctrines, so that we are unlikely to find any significant results on macroeconomic indicators like yearly unemployment or growth figures.

5.4 Comparing Results

Various aspects of data, measurement and model specification have already been discussed in chapter three and four. In order to avoid repetition we concentrate on the comparative aspects of the analysis in this chapter. Since both data allow longitudinal analysis of wages at entry, at time of job changes within and between employers, and on the job over job durations, we compare results using this distinction into three processes of wage attainment with a historically incorporated life course perspective.

5.4.1 First Wages

Our analysis of determinants of first wages at entry into the labor force reveals, that models and theories developed for market economies can also be applied to countries with different political and economic systems, which in terms of gross national product figure on a different level of economic development. Generally speaking we find qualitatively similar effects in both countries. Model 1 in table 7 and model 1 in table 8 report, however, a substantial difference in explained variance in the two countries. The basic model 1 in West Germany explains 29% of variation in first hourly net earnings. The same model applied to the Polish data explains only 14% of the variation in the dependent variable. This indicates, that either there is much more variance in the Polish data, or our models based on labor market theories developed and tested in market economies are not so easily transferable when applied against the backround of a centrally planned economy. Other cross- national comparisons of rates of returns to educational investment have demonstrated much wider differences in values of R^2s between countries than those we report in our analysis.

Including dummy variables for industrial sectors into these models increases the amount of explained variance significantly in both countries. Albeit for different substantive reasons in each country we confirm the importance of industrial segmentation approaches to a broad range of societies and across levels of economic development. Industrial segmentation based on historically defined sectors accounts well for differential reward schemes between industries at time of first entry into the labor market. Since Polish and West German employees have much lower frequencies of job changes during their occupational life histories
than employees in the U.S., industrial segmentation at first entry into the labor market has much more lasting effects.

Alternatively, industries wanting to attract highly qualified people, or industries faced with a continued shortage of labor supply as in the Polish case, will particularly compete for new labor market entrants by offering above average wages to new entrants. The vocational training system in Poland and West Germany reinforces industrial segmentation at entry into the labor market. Certain industrial sectors seem to consider training offered by themselves superior to training in other sectors, or impossible to substitute by training in other sectors. These industries reward their own certificates or apprenticeships in their own industrial sector better than certificates from other sectors.

To measure more precisely such effects of sector specific industrial training we would need to dispose of information of industrial sector to which a vocational training scheme is to be allocated. Since this information has not been readily available in the two data sets, we abstract from these issues. We consider it, nevertheless, important to point out, that this deficiency might mask some form

of early and probably long lasting industrial segmentation in our analysis. Because we cannot control for these factors, or disentangle further this form of early industrial segmentation incorporated into the education system, or alternatively, investigate the selection procedure at the ports of entry into vocational training, we have to restrict our analysis to the test for labor market segmentation at the time of first entry into the labor market and consecutive stages during a person's occupational life history. We are aware of the fact, that this early combination of education and industrial sectors to sector specific training might jeopardize our findings concerning effects of industrial segmentation or general education. It might led to an underestimation of the effect of industrial segmentation and an overestimation of effects of general education.

An additional element of this sectoral view of labor earnings at labor market entry lies in the narrow range of university graduates considered to be suitable for employment in some industries. Occupational training at almost any level leads to employment in a narrow range of industries. Hence, our results by industrial sector reflect the closer link of occupational training and employment in specific industries in both Poland and West Germany versus the loose relationship of occupation and industrial sector at labor market entry in Great Britain, Canada, or the U.S.

We now turn to the comparison of individual effects in models of first wage at entry into the labor market. It needs to be recalled, that in West Germany our data cover the time period 1948-1981, but the interview date in Poland censores our observations to the period prior to the martial law, that is between 1948-1972. Model 1 in table 7 and model 1 in table 8 report individual effects of education, sectoral effects by industrial level and aggregate effects of national economic circumstances and a time reference.

Most labor market theories and derived perspectives agree on the positive effect of higher education to obtain higher starting wages even though explanations of why we observe this phenomenon are still heavily debated. In both analyses we find a significant effect of the main effect of education and the interaction of time trend with education. These results remain significant and nearly unchanged in model 2 of table 7 and table 8, which include dummy variables on industrial segments.

We find the expected interesting country differences in main effects of education. The wage increasing effect of each additional year of education is half the size in Poland. Relative to the minimum level of education West German labor market entrants with the highest level of education received three times higher starting wages in 1950. The comparable figure for Poland in 1950 is 1.7, which means on average a Polish worker with the minimum level of education (8 years) would have gained 60% of the wage of a university graduate (18 years) at time of entry into the labor force at around 1950. Education plays a significant role in both countries after accounting for a number of other individual

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characteristics and historical aspects. Remuneration of educational investment, educational certificates or credentials has only been of half the size in Poland during the observed period.

From the societal point of view Poland attached very high importance to equality within the society. The finding of a lower spread of returns to education at maximum versus minimum level of education is therefore not surprising. It poses, however, a challenge to the credentialling approach and the human capital theory, since during the immediate post war years educational credentials, or people who had heavily invested in their education, have been very rare and universal primary education had not been achieved in Poland.

A sharply skewed frequency distribution of educational certificates in Poland did not produce larger differences in returns to education compared to West Germany at the same point in time. This might appear contradictory to the finding

Table 7: Determinants of the First Wage Rage: Estimates From the Log-Linear Models, Germany

Independent variables	Model 1	Model 2
Constant	−1.74	−2.14*
Education	.111***	.109***
Education * Trend	−.003*	−0.003*
State employer	.158	.221
Large workplace	.087	.050
Skilled job	−.093	−.095
Large * skilled	.213	.181
Industries		
Primary		−2.36***
Small competitive		.028
Competitive craft		.375***
Engeneering-based		.326***
Professional service		.118
Bureaucratic service		.131
Aggregate conditions		
Trend	.076***	.072***
Unemployment rate	.004	.003
% change in GNP	.009	.009
Probability of inclusion		
λ	1.74	2.04
Number of cases	782	782
R^2	.29	.33

* $p < .05$; ** $p < .01$; *** $p < .001$.

reported in chapter 4 comparing West German men and women. In these analysesthe more skewed frequency distribution of education for women than for men in 1950 produced the opposite effect of larger differences in returns to education for women. Just comparing the bare figures we might find, that these results appear contradictory, but once we put them into the historical and societal context, we derive the substantive result, that in Poland in 1950, or in centrally planned socialist countries in general, the effects of returns to education are dominated by the political will of a more egalitarian distribution of wages, at least at entry into the labor market.

Both country models report the same significant negative interaction of time trend with education. This means, that wage differentials due to differences in formal education and training have narrowed at almost the same speed in both countries. The rapid expansion of education systems during the 50s, 60s, and

Table 8: Determinants of the First Wage Rage: Estimates From the Log-Linear Models, Poland

Independent variables	Model 1	Model 2
Constant	−1.805***	−1.844***
Education	.053**	.051**
Education * Trend	−.004*	−.003
State employer	.050	.052
Large workplace	.188***	.099*
Skilled job	.084*	.079*
Large * skilled	−.029	−.051
Supervisory job	−.021	−.006
Industries		
Mining/Iron		.346***
Machinery/Cars		.071
Electrotechnics/Electronics		.134
Chemicals/Rubber		.252***
Construction		.159***
Agriculture/Forestry		−.065
Transportation/Trade		.047
Services		−.531*
Administration/Civil service		−.008
Aggregate conditions		
Trend	.071***	.065***
% change in GNP	−.003	−.005
Number of cases	1021	1021
R^2	.14	.19

* p < .05; ** p < .01; *** p < .001.

early 70s is reflected in these results. Over a period of 25 years since 1950 the wage differential due to the duration of education has come down to 50% in both societies. This almost identical result in two societies with profoundly different organizing principles leads us to the conclusion, that we deal with a process, which can be generalized across different societies independent of the level of economic development. Periods of rapid expansion of education systems led to a reduction in the individual returns to education. The most immediate impact of this general process is experienced by new labor market entrants in Poland and West Germany. [1]

After these conclusive results on effects of education on first wages, we still have little to offer towards an explanation of the paradox resulting from a further human capital interpretation of our observations. Despite politically motivated depression of returns to education in Poland, and the strong increase in demand for higher education up to today in both countries, decreasing returns to education do not have sizable influences on the demand for education. This questions the validity of the statement derived from the human capital tradition, that higher returns to education will stimulate the demand for additional investment, or lower returns to education will decrease demand for higher education. None of these reactions can be observed. In brief, the paradox consists in the seemingly irrational investment behaviour of hundreds of thousands of individual decision makers, who continue to invest heavily in higher education when returns to each additional year of education have been falling over two or three decades.

Alternatively, this suggests a shift in preferences to obtain higher education degrees or just participation in full-time education in both countries. These shifting preferences appear to dominate individual maximising behavior the way human capital theory assumes individuals to behave. As mentioned in the general discussion of labor market theories in chapter two section 2.8 this poses a substantial problem to labor market theories developed in the tradition of neoclassical economics which usually do not allow shifts in preferences to occur.

Following credentialism (Collins 1979), the signalling approach (Spence 1974), or the theory of filtering (Arrow 1973) we can resolve the paradox of continued and increasing duration spent in the education system despite lower returns to each additioanl year spent on general education or training prior to labor market entry. Since more and more people hold higher education certificates the value of this credential (Collins 1979) looses its exclusivity or filtering

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[1] Similar results based on different approaches towards this subject have been found in other countries. Welch (1975) reports some of those for the U.S. At times of expansions of education systems the idea to encourage, or discourage, expansion through the introduction of student loan schemes (OECD 1990, Woodhall 1989) appears to be a questionable idea. Shrinking returns to education put graduates at substantial financial disadvantages compared to previous cohorts of secondary school or university graduates.

capacity. The more people obtain higher education certificates, the less these credentials work as a screening device. A substitution of the filter, or a narrowing of the width of the filter by demanding yet higher qualifications at entry into the labor market mounts the pressure on labor market entrants to obtain even higher education certificates. This process will be reinforced at times of graduate unemployment.

Labor market segmentation measured on the basis of the approach by Lutz and Sengenberger (1974) did not yield significant effects for West German men at entry into the labor market. In Poland we find two significant influences in case the labor market entrant joins a large employer, or if he enters directly into a skilled position. What is usually labelled an internal labor market, a job with a large employer and in a skilled position, is not rewarded with an additional wage premium. The size of the workplace, which means on the Polish background also the large "Kombinate", created by the state government according to planning needs, received preferential treatment as to allowing higher starting salaries to be paid in such large firms.

Introducing dummy variables for industrial sectors we observe a weakening of the effect of size of workplace in Poland. Those industrial sectors with high positive effects on starting salaries are equally those with high firm size. The measure of industrial segmentation adapted from Stinchcombe (1979) increases in both countries the level of explained variance by four to five percentage points. In Poland industries with traditionally larger firm size, such as the mining and steel industries, have the most advantageous wage structure at entry into the labor market. This core industrial segment of strong trade union movement and worker wage bargaining power offered throughout the observed period the highest starting wages in Poland followed by the chemical and rubber industries and the construction sector. These sectors have been the key industries in post war industrial development.

In West Germany the iron and steel industries, chemical industries, electrical machinery and car industries are combined in the category of large- scale engineering- based industries. This labor market segment paid in both countries the highest starting wages to new labor market entrants after accounting for effects of education and combining effects of size of work place and skilled job with industrial sector in the Polish data.

Competitive craft industries, such as construction companies, were a booming industry between 1948 and 1973. The reconstruction after World War Two and the massive improvement of general infrastructure at all regional or federal levels caused a second boom phase during the sixties and early seventies. This segment offered over years the most favourable starting salaries in West Germany. In Poland the construction industry also played a key role in Central planning and therefore it is no surprise to find higher starting salaries in this industry.

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The comparison of positive and significant effects for West Germany, of competitive craft industries and large- scale engineering- based industries, with a ranking of positive effects and significance level in the Polish data, where mining/iron sector is follwed by chemicals/rubber industries and construction, but the coefficient for the car industry and machinery and electronics industries do not reach significance, reflects well the different stages of economic development of both countries. A different level of economic development needs to be reflected in the kind of industrial segmentation we set out to measure, since we cover long time periods in our longitudinal analysis.

The historical context of the rise and peek share of gnp or work force of an industry determines labor relations and job reward systems. Equally labor supply and demand conditions have changed from shortages to abundant supply of qualified labor and even graduate unemployment in West Germany. All these effects appear to be well covered in the form of labor market segmentation we propose for the two countries. For example, the high negative and significant effect of employment in primary industries in West Germany reflects the already described loss of importance and attractiveness of this segment to labor market entrants. In Poland we observe a similar development, but of much less dynamic. The corresponding effect on starting wages on first jobs is smaller and not significant in Poland.

Professional service industries like education and health still offer starting wages higher than the reference category, which comprises jobs in textiles or clothing in West Germany. The more egalitarian wage structure in Poland has probably narrowed the male- female wage differential in the way, that Polish men in professional service industries are also suffering disadvantages as West German women working in this sector.

The recently developed search-theoretic explanation of industry differences contributes little or nothing to our understanding of the country patterns of industrial segmentation. Idle machinery appears to be of little relevance in explaining the distribution of wages offered to employees in Poland.

Finally, the time trend variable indicates the size of what has been called the vintage effect of earnings (Rosen 1976). Due to technological development and general increases in labor productivity wages show a relatively stable trend to increase over time. Our models for first wages in both countries report a positive and significant effect of the time trend. Macroeconomic influences on individual wages cannot be found for starting wages on first jobs. Faster increases in labor productivity in West Germany, probably due to a higher level of capital investment by employers, allowed faster increases in labor productivity, which has positive effects on wages at the beginning of the first job. The differential path of vintage effects between Poland and West Germany of about 10% each year will lead after 20 or 30 years to substantial differences in wage levels between the two societies at all levels of the workforce irrespective of the level of education.

This describes one forceful dimension of the vector of social change described in Figure 3 on page 28.

This imbalance to be paid 2 or 3 times the starting wage on the first job in one society can be expected to give sufficient economic incentive to a number of people to become geographically very mobile. Recent migratory flows before and after the opening of the border between East and West Germany, but also between Poland and West Germany have some economic origins, which have been built up over several decades. Among such reasons could be the widening wage gap for starting wages on first jobs between two countries.

5.4.2 Wage Changes between Jobs

This part of the analysis investigates wage changes conditional on the event, that a job change took place. These job changes may occur within employers or between employers. In both countries we observe more than twice as many job changes between employers than within employers. Since we dispose of no information to account for various reasons of job changes in the two countries, we analyze processes of wage changes between the two kinds of job changes separately allowing full interactions of independent variables.

To illustrate the need to estimate models separately consider the duration spent on the previous job n. A longer duration on the job n will be viewed positively at a job change within the same employer. In the event of a job change to a different employer this evaluation of prior employment duration is likely to be much weaker. Separating the two processes makes it possible for us to have a much more detailed understanding of which variables are important under which kind of job change conditions. In addition, it allows us to test more detailed hypotheses of the process of wage attainment and to identify specific historical country patterns.

Wage Changes at Job Changes within Employers

Wage changes at intra- firm job changes are reported in table 9 model 1 and 2 for West Germany and in table 10 model 1 and 2 for Poland. They are little affected by individual characteristics such as age, education, job experience, and duration of previous job. After employment for some time these general characteristics do no longer determine wage increases on the same job. Possibly, in- company evaluation of an employee's work replaces general individual characteristics and educational credentials.

Labor market segments play an important role in this process of wage changes within employers. Size of the employer and the employer's location in the state sector do not create significant differences. Contrary to expectations derived from the theory of internal labor markets, we do not find larger wage gains for employees identified as belonging to such an internal labor market at job changes within employers, neither in West Germany nor in Poland. However, leaving a job within an internal labor market is penalized in both countries with the highest negative effect. Our analysis so far suggests, there are sanctions in form of loss in wages when leaving an internal labor market. There is no way open to us to control for non- pecuniary benefits either of payments in kind, or benefits in terms of greater job security, both factors unmeasurable to us in this data set.

In Poland the addition of variables on industrial sectors contributes no further improvement in the overall fit of the model, but we observe, that the effect of a job change into a position with supervisory responsibilites has a positive and significant effect on wages at job changes. This indicates, that increased responsibility on the new job might also be an important determinant of a worker's remuneration. Unfortunately, we cannot make a direct comparison with the West German data, because data for West Germany contain no such information of this job characteristic. This appears to be a serious omission, since estimates of sectoral effects show that sectors, which offer higher starting wages, reveal less preferential treatment of workers at subsequent job changes within the same firm.[2]

If job changes into supervisory positions are especially rewarded, then it is understandable, that competitive craft industries, large- scale engineering- based industries and small competitive industries have lower wage changes at job changes within employers relative to the reference category. In all models including industrial labor market segments sectors the reference category is the classical capitalist industries, which relies predominantly on unskilled labor, such as the textiles, leather, food and drink industries. Traditional supervision with the idea to discover shirking employees (Akerlof and Yellen 1987) will have to reward particularly well those workers, who move into supervisory positions.

The positive but insignificant time trend in models for West Germany indicates an increase in wage gains at intra- firm job changes during the observed period. For Poland the small, negative and significant time trend agrees with the view about socialist countries having a more egalitarian wage distribution on the societal level and, as we show, a lower spread in the wage structure within a firm, since wage gains at job changes with the same employer are smaller compared to West Germany. Comparing the mean of the dependent variable of 20% in West Germany with only 14% in Poland supports this hypothesis about differences in the wage structure. The difference of the sign on time trend is consistent with the common wisdom, that in Western societies in- company wage gains at, for example, promotions are one of the major forces to further motivate workers. Socialist societies have the declared policy not to stress monetary benefits to encourage additional work efforts.

Estimates with the Polish data confirm the result we found for West Germany of significant benefits to workers who change jobs for the first time in their occupational career. Within employers as well as between employers, and in both countries, new labor market entrants are uncertain about their ranking in company job ladders. The value of their educational credentials might be unclear to themselves and/or to employers. In consequence of this uncertainty about their

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[2] Care must be taken in the interpretation of this particular result because of the low number of cases in the data for West Germany.

own skills and available job offers mismatches of jobs and qualifications are more frequent early in occupational careers. Correction of such mismatches can be identified by positive effects on the variable whether the previous job was the person's first job, or not. A further conclusion to be drawn from this result suggests, that general education, individual characteristics, or credentials in general, leave a high margin of uncertainty on both sides of the employment relationship independent of the societal background.

Wage Changes at Job Changes between Employers

Our analysis of the process of wage change due to change of employers underlines our result of the previous process, that large wage gains are realized when leaving the first job (compare model 3 in table 9 for West Germany and model 3 and 4 in table 10 for Poland). The estimated effect is even larger in the event of between firm job changes. This has several equally possible meanings: (1) job changes at the beginning of the occupational life are particularly motivated by financial gains, (2) a better understanding of how the job market functions makes it easier to operate sucessfully in it, and (3) bad matches in first jobs are corrected in the following job change, whereas good matches entail job stability.

Despite this result of the similarity in the wage attainment process in the two countries influences of other individual characteristics of wage changes at job change between employers differ in substance. In Poland education plays an important role in this process, in West Germany it does not. The general level of education obtained during full- time continuous education prior to labor market entry has a small positive and significant effect. Educational level reached at the beginning of the previous job has a stronger influence on wage changes than the general level of full- time continous education. The most recently acquired educational credential, either obtained while on the previous job in evening classes, or other adult education courses, or in courses attended between the two jobs, has the strongest positive and significant effect.

This result has the interesting substantive interpretation, that a well developed adult education system does allow to correct inequalities in wages due to inequality of access to education at an earlier stage during a person's life course. It also reveals a particular feature of the employment system in Poland, where workers had good possibilities to continue their education while at the same time being employed. In the short term this might entail lower labor productivity on the actual job, which needs to be an accepted, encouraged, or at least tolerated consequence of adult education.

All models on job changes include a variable on historical time trend. Within employer job changes had larger wage gains the more recent the job change occurred in West Germany. On the contrary in Poland wage gains within employers have been smaller the more recent the job had been changed. The tight

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conditions on the labor market during the seventies in West Germany might have reduced advantageous job changes between employers. Indeed we find both a negative and significant effect of the time trend and macro- level unemployment on wage gains at inter- firm job changes. In Poland we find no such effects at between employers job changes.

Table 9: Determinants of the Ratio of Starting Wage Rate on the Destination Job (N + 1) to Finishing Wage Rate on the Origin Job (N): Estimates from the Log-Linear Models, Germany

Independent variables	Intra-firm job change		Inter-firm job change
	Model 1	Model 2	Model 3
Constant	−.430	−.067	.469
Age	.004	.000	−.017
Education	.015	.022	−.023
Education * Trend	−.001	−.002	.001
Job experience	.001	.000	.009
First job (N)	.113*	.079	.125***
Duration in job (N)	−.001	.007	.007
Duration of nonemployment (N to N + 1)			.022
State employer (N)	−.013	.005	.110
State employer (N + 1)			−.063
Large workplace (N)	.088	.119	−.218**
Large workplace (N + 1)			.212***
Skilled job (N	.254*	.207	−.101*
Skilled job (N + 1)	−.051	−.017	.111*
Large * skilled (N)	−.248*	−.243*	.182**
Large * skilled (N + 1)	.120	.104	−.156**
Industries			
Primary (N)		.515	
Small competitive (N)		−.272**	
Competitive craft (N)		−.292**	
Engineering-based (N)		−.252**	
Professional service (N)		−.161	
Bureaucratic service (N)		−.108	
Aggregate conditions			
Time	.018	.016	−.019*
Unemployment rate	−.006	−.003	−.009**
% change in GNP	.003	.002	−.004
Probability of inclusion			
λ	.630	.264	.519
Number of cases	359	359	1259
R²	.11	.17	.09
Mean of dependent variable	.196	.196	.117

* p < .05; ** p < .01; *** p < .001.

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Table 10: Determinants of the Ratio of Starting Wage Rate on the Destination Job (N + 1) to Finishing Wage Rate on the Origin Job (N): Estimates from the Log-Linear Models, Poland

Independent variables	Intra-firm job change		Inter-firm job change	
	Model 1	Model 2	Model 3	Model 4
Constant	.102*	.101	.012	.044
Education	.002	.001	.012**	.012**
Δ Education (N)			.070*	.079*
Δ Education (N to N + 1)	{ .017	{ .024	.191**	.202**
Job experience	.004	.004	.002	.000
First job (N)	.077**	.079**	.127***	.120***
Duration in job (N)	.001	.001	−.004	−.004
Duration of nonemployment (N to N + 1)			−.025**	−.023**
State employer (N)	.021	.016	−.010	−.022
State employer (N + 1)			−.035	−.033
Large workplace (N)	.039	.034	−.125***	−.059*
Large workplace (N + 1)			.150***	.089**
Skilled job (N)	−.026	−.030	−.019	−.019
Skilled job (N + 1)	.053	.054	.034	.031
Large × skilled (N)	.008	.020	.044	.045
Large × skilled (N + 1)	−.038	−.041	−.073*	−.059
Supervisory job (N)	−.037	−.038	−.073**	−.073**
Supervisory job (N + 1)	.046**	.046**	.063**	.055**
Industries				
Mining/Iron (N)		.035		−.238***
Machinery/Cars (N)		−.002		−.098***
Electrotechnics/Electronics (N)		−.000		−.058
Chemicals/Rubber (N)		.009		−.119**
Construction (N)		−.040		−.079**
Agriculture/Forestry (N)		.054		.099*
Transportation/Trade (N)		.015		.030
Services (N)		.172		−.066
Administration/Civil service (N)		.039		.018
Mining/Iron (N + 1)				.189***
Machinery/Cars (N + 1)				.092
Electrotechnics/Electronics (N + 1)				−.002
Chemicals/Rubber (N + 1)				.034
Construction (N + 1)				.059*
Agriculture/Forestry (N + 1)				−.026
Transportation/Trade (N + 1)				−.052
Services (N + 1)				−.028
Administration/Civil service (N + 1)				−.057
Aggregate conditions				
Trend	−.009*	−.009*	−.006	−.005
% change in GNP	.004	.005	.004	.003
Number of cases	1331	1331	2805	2805
R^2	.03	.04	.06	.10
Mean of dependent variable	.140	.140	.060	.060

* $p < .05$; ** $p < .01$; *** $p < .001$.

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This set of effects indicates, that less advantageous conditions on the labor market reduced benefits due to job changes between employers, but, at the same time, increased wage gains of in- company job changes for West German men, although the effect does not reach the 5% significance level. In- company wage gains at job changes have been reduced over the years in Poland, which has the consequence of further reducing the spread of wages within a firm. The increased equality of wages may run the risk of completely loosing its function to set work incentives. If not replaced by another incentive structure this might lead to serious distortions in rewarding work efforts. Due to national policies in Poland and macroeconomic circumstances in West Germany between employer wage gains have been reduced over time.

Turning to the effects of labor market segments according to the operationalization by Blossfeld and Mayer (1988), we observe significant gains independent of a society's organizing principle at job changes to a large employer. In West Germany moving from one large employer to another had no impact on wages, but job changes from the periphery to the core of the economy had positive effects. The situation in the Polish labor market allows even gains to be realized when changing from one large employer to another indicating further differences between various large employers.

Comparing the estimated effects of skill level on wage changes we obtain qualitatively similar results in both countries. Leaving a skilled position lowers wages and job changes into a skilled position increases them. These estimates are only statistically significant in West Germany. In Poland movement into a skilled position is accompanied by a relative wage increase, but not of a high margin. The failure to reach significance of this variable may be due to the introduction of additional variables measuring the increase of general education between jobs. If movement into a skilled position is closely linked to a change in general education than it is no longer unexpected to find an insignificant effect of a change in skill level on relative wages. This result indicates a noticeable difference in the level of formalization of education and skill levels between the two countries. The Polish labor market reveals already at the beginning of the seventies features of a strong formalization of the labor market and a close link of changes in credentials which allow above average wage increases at job changes between employers.

Following the operationalization of labor market segmentation by Blossfeld and Mayer (1988) the effects of skill level and size of employer are not additive. This strong version of labor market segmentation was confirmed for men in West Germany in the previous analysis in chapter 3. Results for Poland do not differ in the sign of these interaction effects but after including other variables on labor market segments the interaction of skill level and size of employer looses significance, which was not the case in estimates with the West German data (compare chapter 3).

The Polish data allow to measure the impact on moving into a supervisory position on wages. Leaving a supervisory position lowers men's wages significantly, and upward job mobility into a supervisory position increases wages significantly. This pattern of effects follows the one found on skill level in the West German data. Upward job mobility as measured by skill level in the West German data may be better measured with a variable on supervisory job characteristics, especially when supervising other workers is considered a worthwhile skill, or higher skills justify supervisory positions.

Seen against the historical background of the Polish society prior to martial law the significant wage increasing effect of moving into a supervisory position either at job changes within or between employers exposes an interesting feature of the Polish labor market and employment relations. A work incentive structure, which denies itself to rely predominantly on differences in monetary wages may need ample structures of supervision to avoid shirking.

Adding industrial sectors to models of wages at changes between employers did not improve the fit of the model when applied to the West German data. A sizable improvement of the fit is reported by model 4 in table 10 for the Polish data. Relative to classical capitalist industries like food, leather, printing, and textiles, workers leaving large- scale engineering type industries suffer significant wage losses when leaving these industries. In Poland these industries comprise in order of size of effects mining/iron, chemicals/rubber, machinery/cars, and construction. Significant wage gains are realized when changing industrial sectors to take up employment in mining and steel industries or the construction sector, a finding in agreement with earlier results on first wages. Mining, steel and construction industries are the officially favoured industries as continually ascertained in each national economic plan in Poland. This result reaffirms Domanski's finding (1988) based on cross- sectional data. He also singled out the above average earnings of workers in mining and construction industries.

An industry by industry comparison of effects at job changes between employers identifies the mining and steel industries as the best paying industry. Workers leaving this industrial sector can in no other industry achieve equally high wages. Put differently, workers entering this industrial segment for the first time will always realize wage gains independent of the industrial sector of their previous employment. Similarly, workers leaving employment in industries associated with the agricultural sector of the economy will in all events gain in terms of hourly wage rates when changing jobs between employers to another industrial sector.

Our analysis of between employer job changes allows us to stress the importance of including variables measuring industrial segmentation in models of wage attainment in both West Germany and Poland. The effects reflect well the societal differences between the countries as well as the different levels of economic development.

5.4.3 Wage Growth within Jobs

We now turn to the dynamics of wage growth with duration on the job. Our analysis measures the impact of personal characteristics, labor market segment and job duration on the rate of change in wages. Details of modelling this process of wage growth can be found in chapter three section 3.5 of the dissertation. In this chapter we concentrate on the comparative interpretation of results and therefore refer to the section 3.5 above for more detailed comments on the features of this dynamic model using a stochastic differential equation.

Four theoretical perspectives are of particular relevance to the interpretation of empirical results in this dynamic process of wage growth. The human capital tradition holds, that the growth rate for wages over longer durations of employment decelerates. Education will have continued wage increasing effects, a view which is debated by the credentialling approach. Efficiency wage models (Akerlof and Yellen 1986, Bellmann 1986) stress the importance of increasing wage profiles with job durations, because of the motivating effect of wage gains and to discourage shirking. Segmentation approaches attempt to identify segments with faster or slower wage growth.

Table 11 reports estimates of wage growth in Poland and West Germany. Due to differences in the data sets like coverage in years and availability of variables models differ slightly for the two countries. The variable on age is omitted in the Polish estimates because we found a high correlation with other variables due to the shorter observed job durations. More detailed questions on post compulsory education allowed us to include a measure of changes in educational attainment while on the job for Poland. Because of difficulties of adequate measurement of aggregate unemployment figures in Socialist countries we decided to exclude this variable in models for Poland. The omission to include the probability of inclusion in the sample of Poland is not expected to cause a serious bias in results, because estimates for West Germany without this correction for possible sample selection bias due to non- response have generally led to identical interpretations of results.

For West Germany we found the initial growth rate of men's wages is .065 per year which declines at a rate of 2 * (.0011). This means wage changes are positive over the longest job durations of about 30 years, but approaches zero thereafter. Estimates with the Polish data yield an initial growth rate for men of .0272 and a rate of declining growth of 2 * (.0015). The estimates for Poland imply that after about 20 years of continuous employment on the same job wage growth equals zero. The smaller initial growth rate and the steeper rate of decline estimated for Poland indicates much flatter duration earnings profiles for Polish men compared to West German men. Comparatively little increases in wages over job durations might have failed to set sufficient work incentives in Poland. We consider it a likely conclusion that this could have led to ample shirking, since

following the efficiency wage models, there are no high penalities if workers are found out shirking. Losses in wage growth possibilities while staying on the job, when equally no "worker discipline device" such as the threat of unemployment is existant, have little power to discourage shirking.

A higher level of general schooling/training increases the rate of wage change for West German men. For Polish men we find no significant effect of the general level of schooling/training. However, the additional variable on changes in educational attainment on the job introduced in the Polish estimates is significant. Additional educational or training efforts of workers are rewarded with steeper growth in wage rates on the same job. These results support a human capital interpretation of the productivity increasing effects of general education in West Germany and the productivity enhancing and wage increasing effect of formal education and training while on the job in Poland. However, this process of wage growth due to further education while being employed needs to be analyzed in more detail in the two countries since there might be a problem of selection into further education programs involved which we cannot investigate in this chapter.

Table 11: Determinants of the Wage Rage Growth on the Job: Estimates from the Stochastic Differential Equation Model, Germany and Poland

Independent variables	Germany	Poland
Initial growth rate $(\sqrt{Dur})$	.0650***	.0272***
Rate of decline $(Dur^{3/2})$	−.0011***	−.0015***
Age	−.0013	
Education	−.0022*	.0004
Δ Education		.0070*
Job experience	.0006	.0000
First job	.0482***	.0227***
First job × $Dur^{3/2}$	−.0014***	−.0003*
Aggregate conditions		
Trend	−.0018***	−.0005
Unemployment rate	−.0007	
% change in GNP	−.0005	.0006
Probability of inclusion		
λ	.0516***	
Number of cases	2541	6903
R^2	.22	.11
Mean of dependent variable	.086	.082

* p < .05; ** p < .01; *** p < .001.

Adult literacy programs and industrial training for employed workers increase workers labor productivity. Our results suggest that in Socialist countries these forms of additional educational qualifications have been rewarded with higher monetary wages, a very important result for developing countries which are in the process of diversification of employment away from an employment structure with a high share of workers in agriculture.

Growth rates in wages on first jobs are higher in both countries relative to subsequent jobs. Independent of the level of economic development, or the organizing principle of a society first jobs outside agriculture have special attributes like steeper wage growth. In Poland higher wage growth on the first job remains little changed even for long job durations.

The time trend, significant in estimates for West Germany, has no such effect in estimates for Poland. Whereas recency of entry in West Germany can be after the oil- crisis, failure to find a significant time trend for Poland may be due to the shorter observed time period just up to 1972 or a very stable wage structure because of political reasons.

Somehow unexpected is the result, that neither the operationalization of labor market segmentation using size of workplace and skill level of job, nor the one using industrial sectors has a significant impact on the rate of wage changes while staying on the same job. This finding for both West German men and women is replicated for Polish men.

The national wage bargaining procedure in West Germany has a particular feature of employer/trade union wage bargaining by industrial sector where the metal sector has the leading role of setting overall national wage signals for subsequent negotiations in other industries. This view of the wage bargaining process in terms of wage signals set by the leading industry and close following of such signals by other industries and on the regional level in the same industry can explain the absence of systematic effects of labor market segments on wage growth in West Germany. A similar reasoning might explain the same finding for Poland of no differences between industrial sectors in wage growth when staying on the same job.

Finally, comparing the mean of the dependent variable for the two countries in table 15 shows on average smaller wage growth with duration in Poland but maximum job durations are also shorter due to censoring by interview date. The model for West Germany explains a higher percentage of the variance in the dependent variable indicating that our models for Poland might lack some variables of specific importance to the process of on the job wage growth in Poland.

5.5 Discussion

The historically incorporated comparision of the Polish labor market prior to martial law but just until 1973 and the West German labor market between 1948 and 1982 yielded a number of interesting insights towards a historical view of the process of wage attainment and incentive systems in the post-war period. The distinction in three basic processes (1) wage rates at first entry into the labor market, (2) wage changes at job changes, either with the same employer, or to a new employer, and (3) wage growth over job durations provided a useful structure to pursue an incorporated comparison of wage attainment processes taking a life course perspective.

In our longitudinal analysis of wage attainment the comparative-analytic perspective is often imposing too many limitations on adequate historically incorporated country models so that the application of the comparative method proposed by McMichael (1991) proved to be a useful analytical tool to substantiate a process of wage attainment of broader applicability than the two country examples presented in this chapter.

Through the inclusion of a time trend in our models we can estimate effects of individual characteristics and firm level influences on wages without the influences of historic changes on these effects, to some extent net effects independent of historical time. At the same time the size of the trend variable signals whether there have been important historic trends that influence wage attainment. The combination of individual effects with the time trend allows us to get some measure of changes of these individual effects, choices and constraints over time. It is because of the inclusion of these factors that we find many significant effects which allow us to compare different institutional settings of wage structures over time.

The impact of schooling/training on wage attainment is strikingly similar in both countries despite the systemic differences between the two countries. A higher level of schooling/training has significant positive effects on first wages. The interaction of time trend and eduation, which captures the rapid expansion of education systems during the observed time period, shows the same effect of reducing first wages when subsequent birth cohorts obtain higher levels of schooling/training.

One principle of a Socialist country is the more egalitarian distribution of wages. This is reflected in the model of first wages by the fact that monetary returns to education at entry into the labor market in Poland are only half the size of the value estimated for West Germany. General schooling/training or a change in the level of schooling/training has no significant effect in the process of wage changes at job changes within the same firm. However, schooling/training and changes in the level of education are rewarded for Polish workers at job changes between employers. The highest educational level obtained in West Germany had

significant positive effects on wage growth. For Poland we found with a more detailed measure of schooling/training that it is not the general level of schooling/training which has wage increasing effects but changes in the level of education while on the job.

As a summarizing argument we retain as a characteristic of a socialist wage system the fact that initial differences in educational attainment create lower differences in starting wages. The Polish wage system has also the characteristic to reward additional post-compulsosry education efforts with steeper growth in wages. Hence, the structure of the wage system sets incentives to workers to continue their formal schooling and training. The Polish wage and incentive system appears to have worked well to encourage workers' interests to obtain additional educational qualifications. The flatter wage growth profiles on the job may however have failed to set sufficient work incentives on the current job.

We find some similarity in the structure of labor market segmentation in both countries. Large-scale engineering-based industries and competitive craft industries in West Germany and mining, iron, chemicals, rubber, and construction industries in Poland offer superior wages to labor market entrants. In Poland this pattern of labor market segmentation is maintained at wage changes when changing jobs between employers. Additionally for Poland we find the importance of supervisory responsibilities as a job characteristic to determine wage changes at job changes. In the analysis of wage growth on the job, as well as in the analysis of wage changes at job changes with the same employer, there are no significant effects of industrial sectors on these processes. This indicates that either there are no differences in wage systems and wage trajectories within firms belonging to different industrial sectors due to national regulations or agreements, or our empirical models lack crucial variables to identify such differences. The former conclusion appears to be the more realistic explanation to us.

Labor market policies that try to influence labor market segmetation have to be directed towards the ports of entry into industrial segments and the process of job changes between employers. Greater equality of educational qualifications does not create equal access to jobs in certain industrial segments. Labor market segmentation therefore takes the form of barriers to entry into an industrial sector already at time of first entry into the labor market as well as at times of subsequent job changes. Wage and incentive structures do not show different patterns between industries they just function on different levels. To illustrate this argument, percentage wage increases on the job are similar between industrial sectors, but the level of wages are different right from the beginning of an occupational career. This general result can be retained from the historically incorporated comparison of the, at that time, very different societal and economic organization of Poland and West Germany.

Finally, we want to dare some informed speculations on possible consequences of a "real world experiment" of a reunification of two such societal

systems described above, the former East Germany and West Germany. The education system of East Germany resembles closeley the one of West Germany at least with respect to national figures of enrolment levels at all levels of education. For that reason we do not expect drastic changes in the main effects of education on wages in the three processes. The sudden rise in the total number of persons holding university degrees or university entry qualifications may lead to a rise of the negative interaction of education with time trend, with the consequence of further reducing differences in starting wages of labor market entrants with different levels of eduation.

The similarity of the patterns of labor market segmentation in Poland and West Germany gives reason to assume a similar structure of labor market segmentation in East Germany. Therefore, the reunification of the different economic systems should have no major impact on the existence, or persistence, of labor market segmentation in one single German labor market. The structure of labor markets and reward systems in Central and Eastern Europe show despite many differences of degree a substantial amount of similarity and unidirectional development.

6. Summary and Concluding Remarks

In this chapter we want to summarize the major findings of chapters three to five which contain the empirical results of the analyses in order to derive our conclusions and to present an outlook on future research issues following on from this work. So far results have been presented in each chapter on the basis of the samples used in the analysis, i.e. West German men, women and Polish men. The summary of results is organized according to research topics formulated in the introduction and the hypotheses derived in chapter two.

The Dynamics of Education and Wage Growth
The dynamics of education and wage growth have been the principal research topic of this study throughout all chapters. The analyses presented stress the importance to apply a life course perspective in the analysis of the process of wage attainment and education. Labor market theories propose to evaluate the impact of education on life-time earnings. However, longitudinal data which follow the earnings trajectory of an individual over such a long time have hardly been available. The German and Polish life history data allow to carry out such tests.

For West German men (chapter three) we found that education has strong effects on first wages. Due to the rising number and percentage of a birth cohort who obtain a higher education certificate the impact of education on wages at first entry into the labor market has decreased over time (compare also appendix I for a more detailed investigation of the substantive interpretation of the time trend in the analyses of life-time earnings). Successful completion of general education has become a necessary but still not sufficient condition for West German women (chapter four) for their integration into the labor market. Additionally, differences in starting wages among women which originate in differences in education are larger than among men. Women's mean of starting wages is equally well below the mean estimated for men.

The country comparison of Poland and West Germany (chapter five) indicated that the impact of education on first wages has been similarly strong in both economic systems. This "extreme case" comparison of country dynamics of education and first wages allows us to generalize our conclusion across economic systems and the level of economic development of countries. Higher levels of education have significant positive effects mainly on starting wages on the first job. A rapid expansion of the education system has the same effect of reducing first wages for later birth cohorts at labor market entry across countries.

The impact of general education on wage changes, when changing jobs either within a firm or between employers occurs at the same time, have not proved to be important in West Germany. West German men gained more at job changes within firms than between firms. Apparently these processes of wage attainment

work independently of the level of education. Wage changes of women cannot be explained by their level of education as a realization of higher rates of return to early investment in education. Higher educated women are running a higher risk of wage losses probably due to other factors than levels of education. Such factors may have consisted in greater household responsibilities, the difficulty to combine child care and professional career advancement for women during most of the post-war period.

In Poland job changes were generally more frequent than in West Germany. As a consequence, wage gains when changing jobs were also smaller. However, levels of general education had a small positive impact on inter-firm job changes. More important effects were found concerning further education efforts during the previous job and further education during the period when changing from one job to another. A Polish- German comparison suggests that German firms award their own internal performance certificates or assessment of skills to evaluate a worker's productivity. The Polish socialist labor market has been more institutionalized in the sense that higher productivity workers were given the chance to obtain additional general education certificates while on the job.

General full-time education influences wage growth within jobs. Educational differences between employees lead to steeper earnings trajectories for West German men with increasing job duration. However, the large majority of women appears to follow different internal career ladders than men. For women wage growth within jobs has been unaffected by women's level of education. The country comparison added another dimension to the consideration of effects of education on wage growth. In Poland the major part of wage growth on-the-job is explained by further education received on-the-job. In the socialist system the change in education and not the level of general full-time education has been more important. Similar trends have become apparent in Germany since the beginning of the 1980s (Schömann and Becker 1994).

Labor Market Segmentation
In our estimates of the process of wage attainment for men we identified the lines of labor market segmentation in the post-war West German labor market. Industrial segments as defined by Stinchcombe (1979) influence the process of starting wages on first jobs of West German men. Male workers in the craft industries (i.e. electrotechnical, metals, mechanics, optics, musical and sport instruments, toys and jewellery, and construction) and those entering large scale engineering-based industries (i.e. energy, water, mining, public utilities, chemicals, oil, iron, steel, non-ferrous metals, machinery, automobiles, steel construction, office machines, communications and transportation) have significantly higher starting wages on first jobs than other segments.

These industries pay higher starting wages for men but do not pay women entering these labor market segments significantly more than other segments.

Women starting their working career in the professional service industries (i.e. health, science, education, arts, press, churches, associations and private households) have significantly lower initial wages than those in the competitive industrial segment (i.e. printing, leather, textiles, clothes, food and paper). Both men and women in the traditional primary industries (i.e. agriculture, forestry, fishing and animal husbandry) had, as expected, the lowest starting wages.

For Poland we found the same type of industrial segmentation as a useful explanation of labor earnings. Industrial segmentation following a classification based on Stinchcombe's theory of labor market segmentation explains best the distribution of starting wages. This supports the general view that firms belonging to specific industrial segments sort the many applicants into careers in industrial segments independent of the economic system and the level of economic development at entry into the labor market. We, therefore, conclude that in most labor markets a process of early selection into industrial segments is at work, which operates independent of the political or economic system of a society.

The application of classification into labor market segments following Lutz and Sengenberger (1974) and Blossfeld and Mayer (1988) into (1) internal labor market jobs, (2) craft-like jobs, (3) mass production jobs and (4) peripheral jobs is most suited to explain the process of wage changes at job change between employers. Contrary to our expectation wage gains when changing jobs in internal labor markets (skilled jobs in large firms) are lower than in other sectors for West German men. Men do not gain from moves between one large employer to another equally large employer, but mobility from the periphery (i.e. from unskilled jobs in small firms) to the core of the economy (i.e. to skilled jobs in large firms) has the effect of increasing men's wages significantly.

The same four-fold classification of labor market segmentation proved to be useful in the analysis of women changing jobs. Women realize higher earnings by moving to large firms and by moving into skilled positions, but they do not gain additionally by moving into an internal labor market (skilled positions in large firms). These effects are similar for West German men and women in the event of changing jobs and employer simultaneously.

The labor market structure in Poland is not well explained if one applies only the four-fold classification of labor market segments as we did in our analyses of the German labor market. For within firm changes none of these effects reaches the significance level, and at job change between employers only moving to a large workplace has the expected positive and significant effect. Wage gains at job changes within firms for Polish men are high when some supervisory responsibilities in the new job are involved. Movement into skilled positions does not yield additional wage gains at job changes within or between firms. Due to the correlation of further education and higher skill levels the results suggest that wage increases when changing jobs were tied more closely to formalized educational certificates rather than the skill level in more general terms.

The Importance of the First Job

The first job in a person's occupational career has been deliberately singled out as a rather unique process of wage attainment[1]. The way a society structures the life course of labor market participants starts with the "transition period" of entering into the first job. In this section we want to review the evidence presented in the previous chapters on the importance of the first job for subsequent job changes and wage growth (sections 3.3, 4.2 and 5.4.1).

Industrial segmentation at entry into first jobs has lasting consequences which continue into other jobs over the life course. Wage gains are higher for men and women when leaving the first job. No difference between Poland and West Germany exists in this respect. Bad matches of employees and skill requirements of a job early in a person's career, especially during first jobs, can be corrected by job mobility. Substantial wage gains can be realized in these events.

Alternatively, first jobs might be differentiated due to the amount of initiation training provided on the first job. In some instances employees bear most of the training costs and, subsequently they try to recoup these training costs by higher wages. Our analyses show that these employees have to recover their own investment costs mainly through wage gains due to job mobility. More rapid wage growth on the first job in all our analyses suggests that labor market entrants are offered steep wage profiles at the beginning of a job. Longer durations on the first job lead to declining rates of wage growth.

These results highlight the importance of the first job in all our analyses of labor earnings over the life course as a major factor determining labor market success and earnings trajectories. However, we need to stress the fact that these patterns could only be identified because we applied a life course perspective to the structure of the labor market. It proved to be useful to make use of more than one labor market theory to explain the structure of labor earnings over the life course. A socio-economic approach to view individuals as embedded in societal structures made it possible to synthesize the different steps of our empirical analysis. Similarly, without a historically incorporated approach towards the analysis of earnings trajectories estimates would have been biased due to the omission of an adequate treatment of the concept of time in the ensuing longitudinal analyses of life events.

The Concept of Time

Another major finding has been the necessity to include a more elaborated notion of time in our analyses of social processes in general and labor market phenomena in particular. This point is already forcefully argued by Tuma and Hannan (1984) when they present a multitude of available models and methods

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[1] This line of research has become known as the "critical phase" of the school to work transition (compare Schömann 1994).

for longitudinal analysis of social dynamics. Much of the answer to the question why whole communities, and individuals as parts of them, are rich or poor (Cannan 1914) can be given by knowing how a community reached the level of its current wealth, since these are path dependent evolutions. This means we need to answer questions about the evolution of societies in time and differentiate between structural changes with and without direction.

Through the identification of basic processes of wage attainment: (1) first wages at entry into the labor market, (2) wage changes at job changes within and between employers, and (3) wage growth when staying with the same employer, we are able to approach a person's occupational life history respecting individual time dependency of events. As an example of time dependency of events we analyzed the process of entering the labor market by simultaneously incorporating individual experience of time (the school to work transition) within the historical background of social time (the baby boom cohort) and the evolution of societies.

We tried to operationalize the concept of time for the analysis of social change (compare section 2.3 and figure 3). Longitudinal analyses have faced difficulties due to the multidimensional properties of time as regards social phenomema. In addition to the established distinction of time in age, period and cohort effects, we undertook a special effort (demonstrated also in the appendix) to identify additional social dimensions. As one example we introduce the time related phenomenon of rapidly increasing student numbers in the model of wage attainment.

Inclusing this macro-level time related effect on individual earnings had significant effects on labor earnings. Such temporal effects can be identified in cases if the "intrinsic velocity" of a social phenomenon is more rapid, or markedly slower, than chronological time. These effects then turn into a dimension of their own of the "vector" of social change. The stronger impact of high unemploymemt rates on earnings for women compared to men is another manifestation of different dimensions of social change affecting parts of society quite differently.

Historically Incorporated Comparisons Allow Generalizations
The application of McMichael's theory (1990) of historically incorporated comparisons using longitudinal micro-level data avoids the fallacy of many quantitative approaches to abstract social processes from their precise setting in time and space. The precise location in historical and social time by identifying age, period and cohort effects as basic dimensions of the more general process of social change allows us to derive the following generalizations of the process of wage attainment.

Education has powerful effects on first wages independent of the level of economic development or the organizing principle of a society. Similarly, a rapid expansion of the education system leads to reductions in individual returns to education or the value of formal schooling certificates as screening device. The

absence of significant effects of education on earnings at job changes within the same firm suggests that employers consider education more as a screening device when hiring new employees. Employers remunerate educational attainment only to a lesser extent for its productivity enhancing capacity, as is claimed by human capital theory.

The inclusion of the time trend and the interaction of the time trend with a person's level of education allows us to make statements about changes of individual choices and societal constraints concerning education and earnings aspirations over time. It is this combination of effects which makes it possible to advance in the direction proposed by Elias (1978) to understand the concepts individual and society as changing and interrelated dynamic units.

Labor earnings vary according to industrial segment. Segmentation manifests itself largely at entry into the labor market with little possibilities to correct early recruitment into a disadvantagous industrial segment. Efficiency wage models, and particularly the view of aggregate unemployment as a worker discipline device contribute to our understanding of wage patterns between countries. If the level or growth of labor earnings is positively correlated with a country's productivity, then efficiency wage models can explain to a large extent "why some countries are above and others below the average in wealth" (Cannan 1914). It is the wage structure within a society which provides guiding principles for work incentives and the allocation of manpower within a society. In case the wage structure no longer ensures an efficient allocation of human resources, a country's overall economic performance is likely to suffer.

The most important result concerning male-female wage differentials is the fact that the prolonged period of equalization of male-female educational attainment had little impact on the narrowing of the wage differential between men and women contrary to predictions inspired by human capital theory. Equality of educational achievements between the sexes has become a necessary condition to obtain greater equality of wages but it is far from being a sufficient condition to achieve equality of wages. There is still some scope for legislative action to influence existing labor market processes to avoid ongoing market failure in this domain and work more effectively against the crowding of women into disadvantaging industrial segments.

We gave many examples how existing labor market theories can be integrated or used jointly in the interpretation of results to explain the variety of individual experiencies and processes of labor earnings. There is no theoretical perspective which could claim to explain all empirical phenomena consistently. Blaug (1989) already commented on the unbalanced representation of the field of economics of education as being almost equal to human capital analysis, particularly as the concept is presented and extolled in Psacharopoulos (1987), or other recent dictionaries of economics. Theory and evidence presented here tries to redress this balance in favour of equally or more important theoretical concepts, notably the

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life course perspective and a historically incorporated perspective in the formulation of theories and hypotheses. A cohort analysis in connection with the screening hypothesis, theories of labor market segmentation, status attainment theory, and the efficiency wage theory which views unemployment as a worker discpline device are important additions to the set of labor market theories necessary to explain processes on the labor market.

Since the time when Elias wrote his statement on the inadequacy of both conceptions, the individual outside society and a society outside individuals (Elias 1978), many labor market theories have been developed, but our understanding of numerous processes on the labor market has remained limited. Issues related to the labor market are still treated in some sociological theories and most economic theories as a domain of either the individual outside society or the society outside individuals. The major impetus of this work has been to present an approach which overcomes parts of this deficiency of labor market analyses by applying a historically incorporated socio-economic analysis.

Therefore, following Elias (1978) we consider the concepts individual and society no longer as relating to unchanging "static" concepts. We developed and applied a dynamic view of both the individual and society to explain labor market phenomena. The results presented in chapters three to five, as well as in the appendix, indicate quite clearly the interdependency of the concepts individual and society if we want to describe and explain more long-term development, the structure and dynamics of labor earnings in modern societies.

Outlook
As a kind of outlook on research issues which follow on from the work presented here we consider an analysis of the transition processes of individuals in a scoiety in transition as an interesting test of the proposed methods of a historically incorporated socio-economic analysis.

As aggregate unemployment continues to work as a worker discipline device for wages of women we shall be interested to follow how the sudden increase in the absolute size of the labor force due to re-unification and migratory flows will have an impact on wages in general and women's wages in particular. Additionally, our models of the process of wage attainment for women still lack the important link to the context of household formation, child bearing and caring for children or the elderly.

A more realistic estimation of longitudinal patterns of life-time earnings might allow us to embark on work to construct measures of expected life-time earnings which could be important inputs in the development of other economic and sociological theories. In extending the measurement horizon of earnings trajectories we can further improve the evaluation of labor market policies.

Appendix I

Reliability of Retrospective Life History Data and Specification Issues

1.1 Introduction

The use of more and more sophisticated methods to analyse earnings data calls into question whether the data collected by questionaires, and particularly when some form of retrospective information is asked for, are sufficiently reliable. The question of misinterpretation of results due to incorrect recall of respondents is an intrinsic difficulty of any study, that makes use of information respondents have to recall.

Among the many different approaches to analyze this topic, some have already been demonstrated by Moss and Goldstein (1979), such as factors of psychological studies of memory, design of questions within surveys, and surveys as a whole, in order to minimise the possibility of biased data. We have chosen a different way to observe the impact of recall on data collection and, most importantly, on the interpretation of results.

Issues of how to avoid the impact of recall errors in the process of data collection shall not be discussed in this appendix. These topics are dealt with by Baddeley (1980) and Moss and Goldstein (1979). Our concern is more with robust estimation techniques in the presence of possible errors in the data.[1] More precisely we set out to analyse the question, what risk of misinterpretation we run by analysing data when there are reasons to believe, that the means and standard deviations of variables may take different values due to respondents recall. We are not attempting to answer questions about the size of errors due to recall (DeGraaf and Wegener 1989), nor do we attempt to explain the sources of unreliability, or attribute them to certain variables of higher or lower probability of containing errors (Becker 1990, Poulain, Rinadey, Firdion 1991).

Our approach explores the possibilities of a unique data set of a three wave panel containing retrospective life history data which was funded by the Max Planck Institute for Human Development and Education under the responsibility of B. Wegener. The time elapsed between the waves is one month and respondents were asked to reconstruct in each wave their entire life histories with respect to family life, job histories, earnings trajectories and educational attainment (Schneid 1988). Earnings functions in close analogy to those estimated in chapters three to five are estimated for two waves in identical ways.

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[1] The errors in data problem is persistent in its importance since not only people make unvoluntary recall errors, there are unknown instances of deceiving interviewers and other sources of misunderstanding, coding, or transfer errors.

In this appendix our focus is on the reliability of retrospective data. Job information dating back more than 30 years since the interview on the first job ever held is analysed. It is therefore admittable to consider this information among the most unreliable information provided by respondents in this survey. We want to analyse this in more detail by estimating identical models on the determinants of earnings on the first job when two independant questionaires from the same person are available.

In reestimating identical models we want to recast the reliability question by defining retrospective data to be sufficiently reliable if regression coefficients and their level of significance lead to the same conclusions in both analyses.[1]

1.2 Approaches to Reliability

One possibility of dealing with sources of unreliability is to carefully design a survey and construct questions in a way that respondents do not need to rely on recall. In practise, however, this is hardly a feasible solution. For example, any question about full-time education contains retrospective elements in some sense, even if respondents are not asked to give details about durations or timing of these events. Records or documents respondents have kept of events may be a way out in order not to make use of recall data. Literature on problems involved in this kind of data collection are described in Moss and Goldstein (1979).

A second way of treating sources of unreliability is to try to identify typical errors, that have their origin in recall or the retrospectivity of data. One such example is the telescoping- and omission error documented in Sudman and Bradburn (1974). They found that importance and frequency of events have positive effects on the reliability of responses. Since earned income accrues usually every month at a fixed date, and secondly, earnings are of sufficiently high importance to almost all respondents, these two factors should render retrospective earnings data at least as reliable as most other retrospective data.

It is a frequently quoted statement, that the longer ago an event has taken place, the less reliable is reporting (Friedrichs 1973, Toelke 1989). However, evidence provided by Hauser and Featherman (1977) shows that details of a job held five years ago need not be more unreliable than the one given for the current job.

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[1] Issues of sampling techniques are already discussed by Kirschner in the book by Mayer and Brückner (1989). The results of a comparison of the German Life History sample with the official statistics has been carried out by Blossfeld (1987c). Because of sufficient representativity of key variables like social status, regional distribution, cohort distribution, and reconstruction of the social structure retrospectively we do not investigate this form of possible errors in estimates any further. Because of the high correlation of earnings with the social status variable we consider sources for errors due to sampling for earnings data as negligable.

Equally controversial is the debate about retrospective information reported for the first job ever held. Some authors stress the negative influence of the length of time elapsed since this first employment has taken place (Jahoda 1955, Goldfort 1960), whilst others like Featherman and Hauser (1978) defend the reliability of this information if the questionaire is correctly organised in sequences of life and employment histories. This is particularly relevant in the example of reporting information on full-time education and the timing of entry into the labour market.

Another reason to admit retrospective infomation on the first job at entry into the labour market is the concept of central life events (Dierkes 1977). Events respondents consider of special importance are particularly well remembered. Moreover, respondents can be expected to report such events with high intertemporal consistency, which means a very precise location in historical time. This might be the case, because at the time when the event happened, the respondent was involved with strong emotions. Both especially low and high emotions connected to an event will increase the probability of recalling the event and any circumstances related to it. A particular deception of not getting the first job so much desired can be such a case.[2] Obtaining exactly the job at entry into the occupational career a person has been aiming at will render information provided on the first job particularly present in memory. Hence reporting, when asked several times about the job at entry into the occuational life, should be particularly reliable. Some evidence in support of this hypothesis is shown in DeGraaf and Wegener (1989), but the differences between occupational prestige of current or last job, previous job, and first job are in general very small.

The analysis by Becker (1990) on reliability of public versus private sector reporting shows not only, that the first job as occupation is well remembered, but also descriptive aspects of the institutional context of job histories are recalled with high consistency in a second and third reinterview. 96% (95%) gave the same response in the second (third) wave on the question, whether the first job was within the public sector or not.

Additionally DeGraaf and Wegener (1989) found, that the timing of the first job in an occupational career is reported only marginally worse than the beginning of the current job, 61% compared to 59% with one month difference, 88% in both cases allowing 12 months difference. Reliability for jobs between these two was somehow smaller at 55% and 85% in the wave one - wave two comparison. There is even a slight improvement in wave one - wave three comparisons in favour of the information provided for first jobs.

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[2] Questions concerning possible "editing" of own employment histories can not be investigated in this context. In the sense, that these kinds of phenomena are likely to be unusual, they should not be treated much different than deception of interviewers about current employment.

As in the example of timing of events exactly the same dates of job events were only given in about 50% of the cases in the first and second wave for the current, previous and first occupation. Whereas figures on current income have similar reporting of exactly the same amount of earned income in about 50% of the cases. For first jobs this figure even drops to about 40%. Concerning the income variables the comparisions of wave one with wave three are generally more favourable than wave one compared with wave two.

The percentage absolute deviation as defined by DeGraaf and Wegener (1989) is substantially higher for income at the beginning of first jobs about 30% (27%) compared to 6% (5%) in the case of current income when comparing wave one and wave two (wave one and wave three). Reasons for this higher margin of recall error of income on the first job ever held can be seen in connection with an inflationary increase in earnings. Reporting on current income is done with an average absolute deviation between 4,4% and 6,4% between the three waves.

For earnings, which date back 30 years in some cases, this means, that if a person gains 2000 DM per month in the 80s, we have to expect an error margin of about 5% which equals 100 DM of that income, and a perfectly acceptable error margin within the normal boundaries of rounding money values. Unfortunately respondents might have a tendency to keep this margin of rounding even when reporting on income some 30 years ago. But, because of inflationary effects, their income 30 years ago of 100 DM per month is unlikely to be given with considerably higher levels of absolute precision. A retrospective rounding of earnings of 70 DM to 100 DM per months in 1950 seems not too far off the actual value, but in effect it is a 30% margin. A similarly high recall margin for current income appears unpermittable.

This example should demonstrate the possibility of recall errors to emerge in connection with other sources of errors not directly attributable to recall difficulties. Such a case is the rounding of monetary values. These sources of errors can at least theoretically be well defined, but there remain severe measurement problems, or difficulties to differentiate empirically between these two sources of errors.

The distinction in recall and rounding error needs to be analysed in more detail to derive more precise guidelines of how to avoid these kinds of errors in designing questionaires. An easy way out might be to set ranges and to let respondents allocate themselves to a range of earnings. Of course, if the exact figure is asked for earnings the person analysing the data can make this allocation to ranges himself. The problem with the latter approach is, that there are more than one solution to this allocation of respondents to ranges after the interview.

Following the argument of higher error margins for earnings on first jobs when reported retrospectively, it needs to be accepted, that retrospective earnings data give rise to higher error margins the longer they date back. In data used by DeGraaf and Wegener (1989) respondents seem to set their own intervall of

precision in the first and second wave and the value given in the third wave somehow seems to fall within these limits. This constitutes another possible reading of the results obtained in DeGraaf and Wegener (1989). In focusing on wave one wave two comparisons, as is pursued in this appendix, we therefore account for the largest error margins possible in order to test the influence of the worst cases possible.

Accepting these high error margins, there remain two ways to test the influence they have on estimates of earnings functions, in which earnings are the dependent variable. The most systematic approach is to perform simulation exercises with various experimental settings. Means and standard deviations of variables become parameters of their own when new data sets are built. This technique is also known as Monte Carlo approach (Pindyck and Rubinfeld 1987). However, the difficulty with such evidence is to choose parameters from a realistic background.

Since we have real data at hand we need not have recourse to simulation of error margins in data sets. We deal with actually reported differences in earnings and estimate and reestimate models with errors in variables.

1.3 Data and Definition of Variables

In our analysis of reliability of income data we make further use of the three wave panel on the process of job attainment and job search. This study was financed by the Max Planck Institute for Human Development and Education Berlin with principal investigator Bernd Wegener. The field work was carried out by ZUMA Mannheim in the region of Mannheim, Gruenstadt and Schriesheim to ensure a representative urban-rural distribution of participants (Schneid 1988). The three waves followed with an interval of one month each in September, October, and November 1987.

The study made use of a birth cohort design similar to the Life History Project led by Mayer and Brueckner (1989). Respondents in the Wegener project were born between 1943-47 or between 1953-57. Because of this selection of agegroups respondents could be expected to have held at least one job and comparisons over time of different birth cohorts facing different labour market conditions could be investigated. Conversely, respondents with largely different durations of education may enter at the same historical time into the labour market.

For our special purpose analysis of reliabilty of income data we selected those cases when respondents participated in the first and second wave. This reduces the total number of cases by 17% from 604 cases in the first wave to 497 cases who took part in the first and second wave. A wave one wave three comparison would have reduced the total number of cases by 27% to 440 cases. Further

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reduction in the total number of cases is due to excluding certain occupations. Among those are: occupations in agriculture, because of substantial payments in kind, and the self-employed. After excluding these cases 465 cases remain in the analysis.

As in the analyses using the German Life History Data shown in chapters three and four we make use of after tax income. Respondents specified their monthly earnings on the first job, the time when they started their first job, and the average number of weekly hours worked on the job. Only when these two additional components were reported a case could be included in our analysis. Incomplete reporting and people who have not held a job according to our definition reduced the valid cases further to 374 in the first wave and 368 in the second wave.

The dependent variable is calculated as the log of the deflated net hourly wage rate. Independent variables available in all waves are education, age, size of employer, and a variable on public sector employment. As in many previous studies on the determinants of earned income we apply as measurement of educational attainment the average number of years of schooling required to complete a particular level of education. Coding of the education variables assigns to each level of formal schooling and vocational qualification a number of average years spent to obtain this certificate: lower secondary school (Hauptschule) certificate and no vocational training = 9 years, intermediate school (Realschule) certificate and no vocational training = 10 years, lower secondary school degree plus completed vocational training = 11 years, intermediate school certificate plus completed vocational training = 12 years, upper secondary school (Abitur) certificate = 13 years, qualifications as master, craftsman; or technician = 15 years, polytechnic certificate = 17 years, and university degree = 19 years.

Even if the combined measure of schooling and training remains somehow crude, because of the focus on successfully obtained certificates, earlier work which applies the same metric has demonstrated the advantage of simplicity concerning later interpretation (e.g., compare Helberger 1983, Blossfeld 1985, Huebler 1988, and chapters three to four of the thesis).

Unfortunately the Wegener Life History data do not contain a variable on industry of job spells. For this reason our measurement of industrial segmentation remains rudimentary. However, we have information on the size of the emloyer and whether the job is located in the public or private sector. Based on these two variables and their interaction we arrive at a fourfold distinction of labour market segments, which ranges from jobs in small firms in the private sector to big public sector employers.

To ensure comparability with our previous analyses of chapters three to five we define as a large firm any firm with more than 50 employees. In these cases the dummy variable takes the value = 1. This definition of a large firm is near to the median of the distribution of firms by size. The distinction in public versus

private employer is determined by the transparent allocation of enterprises to the public sector and the legal and instituionalised entry conditions set by public sector employers. As for the variable on firm size we construct a dummy variable with value = 1 if the job is located in the public sector. To further distinguish between large firms in the public sector and large firms in the private sector, or small firms in the public or private sector we formed the interaction variable of firm size and public sector employment.

Besides this information on the individual level, for example, age, and educational attainment, we have some information on the job and workplace level of analysis, as the number of employees, public versus private sector employment, and large versus small employer. At a third level of analysis we include some historical time series data such as a time trend variable to control for secular trends in wages (compare Hannan, Schoemann, Blossfeld 1990, Schoemann, Hannan, Blossfeld 1991) which takes the value = 0 in 1950 and increases by one for every subsequent year.

Concluding from the previous analyses we no longer include the general macroeconomic variables on unemployment or gross national product, but an aggregate figure for the Federal Republic of Germany on the total number of students enrolled in universities and polytechnics in each year since 1962 (Statistisches Bundesamt 1990). Because of the birth cohort design of the study with respondents born between 1943 - 1947 and 1953 - 1957, the earliest completion of a university degrees is not to be expected before the middle of the sixties. The time series reflects the steady rise in students enrolled in higher education institutes from about 300.000 in the middle of the sixties to about 1.500.000 in 1990.

1.4 Models, Estimates and Re-estimates of First Wages

1.4.1 Theoretical aspects of the models

A lot of research efforts over decades has gone into the analysis of earnings and education. Starting with the human capital tradition by Becker (1964) in economics, and the status attainment approach by Blau and Duncan (1967) in sociology. Both traditions emphasize the importance of general education obtained through formal schooling because of its productivity increasing capacity and therefore eranings, particularly earnings on the first full-time job.

The filtering (Arrow 1973) and signaling (Spence 1974) approach acknowledges the close link of formal education and earnings, but discards the direct link between formal schooling and productivity. The model of job competition (Thurow 1975) focuses on the training costs of new entrants and assumes, that more credentials signal lower training costs to employers. Another

perspective within this tradition, the class reproduction theory, considers education as a form of intergenerational transfer of advantage (Collins 1979, Robinson and Garnier 1985). Soerensen (1979) introduced a model of educational attainment which falls within the credential approach, and introduces the aspect of a person's position in the distribution of educational attainment.

In this appendix we take a closer look on within birth cohort distributions of university degrees. Our hypothesis is, that it is the scarcity, or abundance, of educational credentials, which determines starting salaries of labour market entrants. From the individual's point of view a larger number of upper secondary school graduates, or university graduates will devalue higher education certificates. The intrinsic value of higher education therfore is not its productivity increasing effect, but its exclusivity, or the rareness of the credential. Larger vintages of university graduates depress the money value in terms of starting salary on the first job of this credential for the total cohort. Alternatively additional credentials may be introduced to ensure exclusivity.

Standard empirical models derived from these theoretical positions have taken the form of

$$\ln W_0 = \alpha + \beta'X + \sigma \, ,$$

where $\ln W_0$ stands for the log of the starting salary, α is the constant of the regression, β' the vector of regression coefficients, X the vector of covariates, and σ the residual of the regression.

One of the major extensions proposed in chapter three to five to the empirical specification of these models was the inclusion of a time trend variable and the interaction of this time trend with education. In this appendix we apply the same empirical specification of earnings functions as can be seen from table 12, the estimates from the first wave, and from table 13, the re-estimates of identical models with the second wave of the Wegener data.

Differences in the specification of the models between the previous chapters three to five and models in this appendix (see table 12 and table 13) are due to lacking industry variables in the Wegener data. The addition of age as an independent variable in the models presented in this appendix is due to the hypothesis, that with later birth cohorts the highly institutionalised link between time at school and the immediate transition to the working life afterwards is less valid for birth cohorts which entered the labour force during the seventies and the eighties. For this reason we do no longer exclude age at labour market entry from the analysis of first wages in this appendix since we suspect a decreasing correlation of age at entry into the labour market and education particularly for the birth cohort born between 1953 and 1957. For example university graduates of these cohorts are unlikely to have entered the labour market before the end of the seventies when graduate unemployment had already begun to rise.

We operationalize this perspective by including the student cohort size as an additional independent variable in our models (see table 14 and 15). The idea is to further investigate the theoretically still unsatisfactory finding in the empirical parts (chapters three to five) of the interaction between education and the time trend. The most influential change in education systems over time, especially since the late sixties, has been the rapid increase in university students in almost any part of the world. So far it has not been shown to what extent this aggregate phenomenon of overcrowded universities has had immediate effects on individual earnings and what is the quantitative relationship between the two levels of analysis.

In the structure of our empirical model we refer also to the vintage models developed by Rosen (1976). The advancement of knowledge including teaching practices, and productivity of machines allows similarly that subsequent birth cohorts are more productive relative to previous birth cohorts. This allows, that returns to all levels of education increase over time due to increased general productivity of the economy and accumulated economic growth.

Human capital theory and the neoclassical framework would predict two possible outcomes of a continued increase in the total supply of qualified university graduates: (1) the entry salaries of university graduates will decrease, if the labour market for university gradutes constitutes a specialised section of the labour market. (2) entry salaries will stay the same relative to other salaries, but the number of new entrants will decrease, hence graduate unemployment will result. Unemployed graduates, supposedly very productive people, will compete for other jobs, which do not necessarily demand a university degree, but whose wages are acceptable to graduates (accummulated vintage effects could explain this). In terms of wages on the first job its those people at the lower end of the distribution of education levels who will find themselves either out of labour, or with depressed wages.

However, the emphasis of human capital theory on the close link between increased productivity and higher wages implies rising salaries for subsequent cohorts of better trained university graduates. These two possible predictions based on the human capital framework do not yield a clear cut prediction of the trend over time, and theoretically it remains unclear which of the two possible outcomes will dominate at a certain point in time.

1.4.2 Estimates and Re-estimates

We shall begin the presentation of results by comparing table 12 and table 13 of this appendix with the results obtained in chapter three (table 1). Calculations of the main effect of education on the log of earnings when the time trend is equal to zero in 1950 showed, that for men (women) starting wages for those with 19 years of schooling/training compared to those with 9 years of schooling/training are three (six) times higher. This result from chapter three refers to birth cohorts of men and women born between 1929-1931, 1939-1941, and 1949-51.

The estimates shown in table 12 column 1 of this appendix for the main effect of education reflect a ratio of 6.5 comparing 19 years of education/training with entrants who completed only basic education of 9 years. Re-estimation of the same model shown in table 13 column 1 with the second wave yielded an equally high ratio of 5.5. The coefficient of the main effect of education decreased by 10% from .188 in wave one to .170 in wave two. The interaction effect of education and the time trend decreased about 5 percent. Since these two effects are jointly interpreted, no sizable difference in the interpretation of the set of coefficients results. Changes in the size of coefficients due to re-estimation with the second wave do not justify the reservation frequently encountered when reference is made to retrospective data collection.

Because of the limited sample size we could not split the file into one sample of women and one of men. For both sexes and considering the younger cohorts we can however confirm, that differences in starting wages in the post war years have been very steep as can be derived from the results in chapter four on the male female comparison of wages.

Similarly, when we compare the combined results of the main effect of education and the interaction of education with the time trend chapters three and four reported a drop in the ratio of 19 years of education to 9 years of education between 1950 and 1975 from 3 to 1.4 for men and from 6 to 2.2 for women. Our estimation with the first wave reflects a drop of the same ratio from 6.5 to 1.1. In re-estimating with the second wave we obtain a drop from 5.5. to 1.0. Hence, estimates and re-estimates of the same ratio lead to very similar results. The difference with the results obtained in chapter four is probably due to the fact that we could not distinguish between (1) male and female earnings because of the small sample size, (2) differences in the specification of the model due to lacking industry variables in the Wegener data set, (3) not accounting for the probability of inclusion in the sample, and/or (4) because the younger birth cohorts in this panel data face an even sharper decline in the ratio of starting wages for highly qualified people to those with basic compulsory education.

When comparing across columns the combined interpretation of the main effect of education and the interaction of time trend and education remains stable in column 1 and 2. In column 3 and 4 the increase in the main effect of education

Table 12: *First Wave* Estimates of Log-Linear Models of Determinants of First Wages on the First Full-Time Job (Education and Interaction of Education with Time Trend)

Constant	−4.086096 (.888845)	−3.115459 (.963892)	−5.514318 (1.156172)	−4.356764 (1.251659)
Education	.188276 (.075295)	.165268 (.076122)	.316382 (.101108)	.314221 (.102620)
Education * trend	−.007196 (.003355)	−.007045 (.003382)	−.012348 (.004322)	−.012834 (.004385)
Age	.009138 (.001504)	.008805 (.001537)	.008427 (.001584)	.007967 (.001622)
Public		−.348598 (.128281)		−.568277 (.195158)
Size			.283169 (.102041)	−.826935 (.466346)
Public * Size				.617230 (.254463)
Trend	.134981 (.039284)	.131863 (.039632)	.193254 (.049290)	.198274 (.050037)
R^2	.40	.41	.42	.44
Number of cases	374	374	374	374

Table 13: *Second Wave* Estimates of Log-Linear Models of Determinants of First Wages on the First Full-Time Job (Education and Interaction of Education with Time Trend)

Constant	−4.296039 (.679076)	−3.185366 (.748814)	−5.199840 (.753915)	−3.690489 (.849349)
Education	.170210 (.055224)	.165788 (.056693)	.244222 (.062258)	.258958 (.064532)
Education * trend	−.006896 (.002578)	−.007416 (.002654)	−.009611 (.002933)	−.011046 (.003072)
Age	.011495 (.001366)	.010459 (.001390)	.010811 (.001406)	.009726 (.001421)
Public		−.463453 (.113354)		−.779062 (.169734)
Size			.341280 (.091891)	−.819553 (.396618)
Public * Size				.633265 (.218047)
Trend	.125743 (.030599)	.130185 (.031339)	.158815 (.034229)	.173529 (.035559)
R^2	.49	.51	.54	.57
Number of cases	368	368	368	368

is equally accompanied by an increase in the depreciation of the effect of education over time. Our evidence in table 12 and 13 reports very stable estimates and re-estimates of regression coefficients and standard deviations. Without the exception of the effect of size in column 4 in both tables all regression coefficients are significant at least at the 5 percent level in the estimates of the first and the second wave.

Different or incomplete model specification has a much larger impact on the size of individual coefficients than the observed differences in the original earnings data. Therefore one major result of this appendix is the conclusion, that recall errors play a very minor role, if any at all, in the interpretation of results of earnings functions based on retrospective data.

In this respect it is of negative consequence, that we cannot include an operationalisation of labor market segmentation we found to be important in previous attempts. Our simple distinction in public versus private, large versus small, and the interaction of the two variables does not allow any particular new insights as already documented in the chapters three to five of the thesis. Some of this deficiency may be due to reporting difficulties of respondents concerning public sector employment or size of employer, particularly when the employer is located in the public sector (DeGraaf and Wegener 1989, Becker 1990).

In table 12 the R^2 reported for the four different model specifications rises from .40 to .44 in the fourth model. Comparing across columns in table 13 we observe a similar increase from .49 to .57. More interesting than this is the table 12 - table 13 comparison of the R^2s. The R^2 for the second wave models is about .10 percentage points above the values in table 12. In other words, we explain .10 percent more of the variance of the dependent variable using the second wave, or there is less variance overall to be explained in the second wave. This suggests, that panel attrition might inflate values of R^2 for later waves if no adequate correction is applied. This could be due to the fact, that people with "unusual" or "non-average" jobs and earnings histories abstain from consecutive interviews.

Alternatively, respondents appear to have a tendency to average out their responses when asked a second time about their job and earnings history, but it is just as well possible, that in the first wave respondents gave quick and exaggerated responses which they do not want to maintain in a reinterview.

The sizable difference found by DeGraaf and Wegener (1989) of up to 30% difference in wave one and wave two earnings response in some instances is the result of focusing on single value effects. If respondents report earnings in the second wave 30% higher than in the previous wave, possibly they also report in the second wave, that they worked many hours of overtime. The construction of the log of the hourly wage rate take more effects into account than just the net earnings. Other differences may be due to the fact, that respondents report another job as their first full- time job which could lead to high differences in reported earnings data on the first job, but the estimation of earnings functions is little

changed, because various other components of the wage could have changed at the same time, such as the number of hours work on this job, the entry time - hence the correction for inflation, or the values of the education or age variables. All these effects individually or any combination of them would lead to undramatic effects on the estimates of returns to education on the first job.

An article by Courgeau (1991) has taken a similar approach. In estimating identical models with retrospective data of more demographic nature from Poulain, Riandey, Firdion 1991 using information provided by husbands and wife seperately, then re-estimating these models with data from the population registry Courgeau (1991) finds virtually the same results in models based on the two data sets. In spite of some difficulties with the reliability of retrospective data the results obtained using standard statistical estimation procedures allow reliable results and unambiguous interpretation of these results.

In summary, the reliability of estimates of earnings functions will be little effected by even 30% differences in reported earnings data since most changes in reported earnings are accompanied by differences in other job components and individual characteristics. The difficulty which remains, but which is not unique to retrospective data, is to use a clear-cut definition of what is a first job in a job history. Another sensible point is to ensure, that respondents, interviewers, and people coding the data have a clear idea about this definition and apply this rule consistently.

1.5 Further Improving the Specification of Earnings Functions

In table 14 we present results of a slightly changed specification of the earnings functions shown in table 12 and 13. The proposed change consists in replacing the interaction of education and time trend by a variable which measures the size of university student cohorts. This variable is supposed to capture the effect of sizable increases in absolute terms of third level enrolment. The large increase of labour market entrants holding university degrees constitutes a sharp increase in the supply of people with extensive schooling and training. We consider this variable a theoretically well founded addition to standard earnings functions by taking a more substantive longitudinal perspective.

Our findings in table 14 confirm the importance of absolute student cohort size on individual earnings. The student cohort variable is significant in all four models of estimates using the first wave, and in re-estimates using the second wave. The size of the coefficient fluctuates around the value of .0001 and the highest value in each set of four models does not differ more than the size of one standard deviation of the regression coefficient. The substantive interpretation of the coefficient shows that an increase by one hundred thousand university students depresses starting wages on the first full-time job of all new labour market entrants by 1%.

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Table 14: *First Wave* Estimates of Log-Linear Models of Determinants of First
Wages on the First Full-Time Job (Education and Student Cohort Size)

Constant	−3.285887	−2.48342	−3.912382	−2.597002
	(.672082)	(.782598)	(.752465)	(.917958)
Education	.146242	.124359	.182612	.163557
	(.037921)	(.039680)	(.044243)	(.045769)
Student cohort	−.000130	−.000123	−.000172	−.000165
size (in 1000)	(.000043)	(.000043)	(.000048)	(.000048)
Age	.009823	.009610	.009496	.009028
	(.001342)	(.001376)	(.001433)	(.001467)
Public		−.272639		−.542182
		(.122608)		(.189186)
Size			.134511	−1.00002
			(.106873)	(.440398)
Public * Size				.646499
				(.246374)
Trend	.076146	.072616	.099339	.095396
	(.027501)	(.028248)	(.030063)	(.030849)
R^2	.37	.38	.38	.40
Number of cases	374	374	374	374

Table 15: *Second Wave* Estimates of Log-Linear Models of Determinants of First
Wages on the First Full-Time Job (Education and Student Cohort Size)

Constant	−3.236086	−2.187455	−3.832916	−2.079410
	(.576989)	(.655061)	(.595463)	(.714557)
Education	.109595	.093564	.131131	.114595
	(.031100)	(.032534)	(.031639)	(.032647)
Student cohort	−.000092	−.000096	−.000118	−.000121
size (in 1000)	(.000037)	(.000038	(.000039)	(.000040)
Age	.011328	.010511	.011103	.010098
	(.001317)	(.001345)	(.001377)	(.001390)
Public		−.420055		−.758268
		(.115955)		(.174418)
Size			.208800	−1.055774
			(.103623)	(.401224)
Public * Size				.723217
				(.226260)
Trend	.062999	.065973	.084480	.085321
	(.024376)	(.024813)	(.025406)	(.025423)
R^2	.45	.47	.49	.53
Number of cases	368	368	368	368

The expansion of third level education in the Federal Republic of Germany since the late sixties by roughly one million students caused a 10% loss in starting wages for all labour market entrants. This result is particularly interesting because it allows us to refine our theoretical view of the mecanism of why education increases potential earnings. Since earnings are equally depressed for all labour market entrants and not only for university graduates this implies, that with the steep increase of persons holding formal credentials of every level, all credentials irrespective of level loose in value. A neoclassical interpretation of the labour market following the human capital approach does not predict the loss in earnings potential of persons holding lower education certificates when the number of university students increases. The fact that more can do the same job should not influence the productivity of the person actually carrying out the job.

Including the student cohort size in our models of first wages at the time of entry into the labour market reduces the main effect of years of education on earnings. Carrying this argument a little further this means, that most earnings models, which suffer from misspecification because they do not account for the changing size of student cohort populations, and the differential time of entry into the labour market, report an upward bias of the main effect of education.

The fact, that the coefficient of the main effect of education varies very little comparing across columns in table 14 and 15, and less than in models of table 12 and 13 according to different specifications of models, can be taken as an indication of a good specification of the basic model. The size of the constant of the regression and the main effect of the time trend are reduced by sizable margins, which, nevertheless, do not effect their level of significance.[3]

However, the models reported in table 14 and 15 do not reach the same value of R^2 as the model using the interaction of education and time trend instead of the student cohort size. The loss in explained variance is about .04 in models including student cohort size compared to models in table 12 and 13, of the type applied in the empirical part, chapters 3 to 5. The generality of the interaction of time trend with education explains still more of the variance of the dependent variable than the simple measure of the aggregate student cohort size. This means, there is yet more to the trend over time than just the rise in absolute student numbers. We need to apply more detailed dynamic theoretical models in order to fill the vague time trend over years substantively. We made some advances in this direction, but a lot remains to be done both in constructing more specific and dynamic theoretical models and in appropriate operationalization of such models.

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[3] Estimates of models which contain both the interaction of time trend and education and simultaneously the aggregate measure of the student cohort size where very unstable and even the main effects of age, and education in some instances lost significance or changed signs. For this reason we do not report these results.

1.6 Discussion

In this appendix we applied a practical approach to measuring the impact of errors in data on estimates of earnings functions. In spite of large errors in retrospective earnings data (DeGraaf and Wegener 1990) we find that these error margins have very undramatic effects on estimates of earnings functions, and the interpretation of estimates of private returns to education. The reservation towards using retrospective information to estimate earnings fucntions therefore appears grossly overstated.

More serious than the inclusion of retrospective information is the omission of important parts of the proper specification of the earnings function. Differences due to different model specifications have a much greater influence on estimates of returns to education than differences due to recall error. In recasting the reliability question, by defining retrospective data to be sufficiently reliable if regression coefficients and their level of significance in first and second wave estimates, lead to the same conclusions, we found no evidence, that reporting of earnings on the first job ever held is "too unreliable" to obtain "hard evidence" on estimates of earnings functions. From this point of view a lot of previous discussion about the size of the difference of reported earnings seems to be off the point.

Our results, however, do not speak to another possible source of errors, that of different numbers of jobs in respondents occupational histories. Parts of the errors in earnigs data appear to be an outcome of these differences, but with no consequence for estimates of earnings functions. Moreover, because of the lower number of jobs held by respondents in the Federal Republic of Germany than in the U.S. (Mayer and Carroll 1987) this source of errors is not expected to cause a lot of additional "noise" in raw data.

In focusing on the wave one wave two comparison of the Wegener data we allowed for the worst possible error margins of information provided on jobs which date back up to thirty years. Since the worst cases scenario does not jeopardise our findings or the interpretation of main effects, we do not consider it necessary to pursue this line of research for less error prone responses of earnings of more recent jobs, which are additional components of models of job change or dynamic models of wage growth within jobs.

Re-estimates of indentical models with the second wave of the data yielded consistently higher values of R^2. When respondents are interviewed a second time round their responses seem to be of lower overall variance. This phenomenon of normalisation or averageing could have some influence on estimates of earnings functions of long running panels if no correction for this is applied. The usual correction for panel attrition might not be sufficient for those instances, where the variance of responses of those respondents, who remain in the panel is affected by subsequent reinterviews.

Finally, a further extension of standard earnings functions is proposed, which allows a more substantive interpretation of the decline in hourly net wages of new labour market entrants. An increase of the total number of university students by every 100000 depressed the starting salaries of all labour market entrants irrespective of their educational attainment by about 1 percentage point. Additional investigation of this kind of macro-micro link is indicated not the least because of the rapid rise of persons holding university entry certificates in connection with the re-unification of the two Germanies.

Zusammenfassung

Die Dissertation befaßt sich mit länder-, geschlechts-, und sektorspezifischen Unterschieden des dynamischen Verhältnisses von Bildung und Arbeitseinkommen. Die Herangehensweise ist bestimmt durch eine vergleichende Längsschnittbetrachtung auf der Basis von Lebensverlaufsdaten.

Ausgehend von der Sichtweise wie sie Elias (1978) bereits erläutert hat, nimmt die Dissertation ihren Ursprung in der Auffassung, daß die beiden Konzepte, ein Individuum außerhalb der Gesellschaft und eine Gesellschaft jenseits der Individuen, unzureichend sind. Diese Auffassung wird deutlich, wenn die Konzepte Individuum und Gesellschaft verstanden werden als sich verändernde Einheiten. In einem auf Veränderungen bezogenen Ansatz, im Sinne von dynamischen Prozessen, gewinnt die Zeitkomponente dieser Prozesse eine eigene substantielle Bedeutung.

Das Explanandum der Dissertation ist die gesellschaftliche Prägung individueller Lebensarbeitseinkommen. Dazu werden Hypothesen in vier Themenbereichen entwickelt: (1) zur Lebenslaufperspektive in der theoretischen und empirischen Arbeitsmarktforschung, (2) zur Zeitabhängigkeit von Prozessen bei Eintritt in den Arbeitsmarkt, Arbeitsplatzwechsel, und Verbleib auf Arbeitsplätzen, (3) zu geschlechtspezifischen Unterschieden bei den Arbeitseinkommen und (4) zum historisch eingebetteten Vergleich von Arbeitseinkommensverläufen.

In Kapitel zwei werden Humankapitaltheorie, Statuszuweisungsmodelle, Segmentationstheorien, Screening- und Filtertheorien, Kohorten- und Jahrgangsmodelle, Effizienzlohntheorien, und suchtheoretische Erklärungen von Arbeitseinkommensverläufen vorgestellt und wechselseitig diskutiert.

Die wichtigsten Ergebnisse der empirischen Analyse sollen im folgenden kurz zusammengefaßt werden. Die Berechnungen zu den Arbeitseinkommen von westdeutschen Männern haben die Bedeutung der Lebensverlaufsperspektive für die Erklärung von Einkommensverläufen deutlich gemacht. Wir unterscheiden drei Prozesse: (1) die Phase des Berufseintritts, (2) Phasen des Arbeitsplatzwechsels und (3) Phasen, in denen Arbeitskräfte auf ein und demselben Arbeitsplatz verweilen. Für Männer erweisen sich die erworbenen Bildungsabschlüsse als sehr bedeutend für die Anfangseinkommen auf dem ersten Arbeitsplatz. Über die Zeit hinweg, insbesondere im Zuge der Bildungsexpansion, haben sich diese höheren Anfangseinkommen aufgrund von höheren Bildungsabschlüssen jedoch deutlich reduziert.

Unter westdeutschen Frauen sind die bildungsspezifischen Einkommensunterschiede höher als unter Männern. Die Bildungsexpansion hatte dennoch den quantitativ gleichen Effekt auf die Anfangseinkommen der Frauen. Der Ländervergleich von Einkommensverläufen deutscher und polnischer Männer hat gezeigt, daß der Zusammenhang der sinkenden Anfangseinkommen von

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Arbeitern mit höheren Bildungsabschlüssen unabhängig vom politischen und gesellschaftlichen System und unabhängig vom Stand der wirtschaftlichen Entwicklung Gültigkeit besitzt. Diese Ergebnisse unterstützen eher eine Interpretation der Ergebnisse im Sinne der Filtertheorie als eine die der Humankapitaltheorie folgt.

Einkommenszuwächse bei Arbeitsplatzwechsel innerhalb und zwischen Betrieben lassen sich nicht mit unterschiedlichen Niveaus von Bildungsabschlüssen erklären. Dieses Ergebnis fanden wir in unseren Analysen von Einkommenszuwächsen bei westdeutschen Männern und Frauen. In Polen hingegen spielen allgemeine Bildungsabschlüsse eine positive Rolle für Einkommenszuwächse bei Arbeitsplatzwechsel zwischen Betrieben. Bedeutender waren die Effekte von Weiterbildungsanstrengungen während der vorherigen Tätigkeit oder in dem Zeitraum zwischen dem Arbeitsplatzwechsel. Dies legt ebenfalls eine Interpretation im Sinne der Filtertheorie nahe, da die Weiterbildungsteilnahme eine weitere Selektionsmöglichkeit zur Erreichung von Bildungszertifikaten ermöglicht.

Die Lohnwachstumsrate bei kontinuierlicher Beschäftigung auf ein und demselben Arbeitsplatz ist bei westdeutschen Männern positiv beeinflußt von der Höhe des erzielten Bildungsabschlusses gemessen in Jahren. Lohnwachstumsraten für Männer lassen sich daher weitestgehend ableiten aus den anfänglichen Investitionen in Bildung. Dieser Zusammenhang gilt nicht für westdeutsche Frauen. Der Ländervergleich ergab, daß eine voreilige Interpretation der Ergebnisse für deutsche Männer als Bestätigung der Humankapitaltheorie solange unsicher ist, wie nicht Weiterbildungsanstrengungen mit in die Analysen einbezogen werden. Im Falle der polnischen Männer sind es gerade die Weiterbildungsteilnehmer, die die höheren Lohnwachstumsraten aufweisen und nicht mehr diejenigen Arbeiter, die einen höheren Bildungsabschluß vor Beginn des Arbeitsverhältnisses aufweisen.

Segmentationstheorien leisten einen wichtigen Beitrag zur Erklärung der Anfangseinkommen auf dem ersten Arbeitsplatz bei westdeutschen Männern und Frauen und lassen sich erfolgreich auf Prozesse in Gesellschaften mit anderen politischen und wirtschaftlichen Grundorientierungen anwenden. Die industriezweigspezifische Variante der Segmentationstheorie (Stinchcombe 1979) ist in allen Anwendungsbeispielen wichtig zur Erklärung von Einkommensunterschieden beim Eintritt in den Arbeitsmarkt. Eine spieltheoretische Variante der Suchtheorie, die ebenfalls Unterschiede in der Entlohnung von Beschäftigung in Industriezweigen erklärt, findet hingegen keine Bestätigung in den gefunden Effekten nach unseren Berechnungen. Industriesegmente wie sie Stinchcombe (1979) definiert sortieren bereits frühzeitig beim Eintritt in das Beschäftigungssystem die vielen Bewerber in Industriesegmente mit höheren Anfangseinkommen und das unabhängig vom Gesellschaftssystem oder dem Niveau der wirtschaftlichen Entwicklung.

Ergebnisse zu Lohnzuwächsen aufgrund von innerbetrieblichen oder zwischenbetrieblichen Arbeitsplatzwechsel weisen bei geringer erklärter Varianz der Modelle darauf hin, daß diese Prozesse sowohl theoretisch als auch empirisch noch schwer erklärbar sind. Arbeitsmarktsegmente, die in Anlehnung an Lutz und Sengenberger (1974) definiert wurden zeigen vereinzelt signifikante Effekte auf das Lohnwachstum für Wechsel von Arbeitsplätzen mit geringen Qualifikationsanforderungen in kleinen Betrieben zu Arbeitsplätzen mit hohen Qualifikationsanforderungen an Bewerber in großen Betrieben.

Diese Ergebnisse für westdeutsche Frauen und Männer konnten aber im Ländervergleich mit Polen nicht repliziert werden, was die Verallgemeinerung der Gültigkeit der beobachteten Prozesse einschränkt. Weiterbildungsanstrengungen und Tätigkeiten mit Beaufsichtigungsfunktionen waren wichtige Merkmale in der Erklärung der Prozesse der Einkommensveränderungen bei innerbetrieblichen und zwischenbetrieblichen Arbeitsplatzwechsel in Polen. Lohnwachstum bei kontinuierlicher Beschäftigung auf ein und demselben Arbeitsplatz weist keine segmentationsspezifischen Unterschiede auf.

Die Lebenslaufperspektive hat eine Betrachtungsweise des Erwerbsverlaufs in drei Prozessen verlangt. Aus unseren Ergebnissen lassen sich jedoch auch die Aufschlüsse über die Verknüpfung dieser Prozesse gewinnen. Der Eintritt in das Beschäftigungssystem wurde als ein bedeutender eigenständiger Prozess identifiziert. Arbeitsmarktsegmentierung bei Eintritt in das Beschäftigungssystem hat aber langfristige Folgen für den individuellen Erwerbsverlauf, wenn frühzeitige Entscheidungen oder Zuordnungen zu Industriesegmenten nicht in späteren Phasen des Berufsverlaufs korrigiert werden können.

Sowohl westdeutsche Männer und Frauen, sowie für polnische Männer gilt, daß deratige Korrekturen von Bewerberqualifikationen und Anforderungsprofilen beim Verlassen des ersten Arbeitsplatzes zu signifikant höheren Lohnzuwächsen beim Stellenwechsel führen. Ebenfalls in allen Analysen finden wir höhere Lohnzuwachsraten bei Erstbeschäftigungsverhältnissen, was nochmals die Bedeutung des ersten Arbeitsplatzes im Vergleich zu späteren Arbeitsverhältnissen betont.

Die Zeitabhängigkeit der unterschiedenen Prozesse am Arbeitsmarkt wird deutlich in den signifikanten Effekten des Zeittrends auf das Anfangseinkommen, die Zugewinne bei Arbeitsplatzwechsel, und die Lohnzuwachsraten bei kontinuierlicher Beschäftigung. Nur bei möglichst genauer Einordnung in die jeweiligen historischen Gegebenheiten, das am Beispiel der Bedeutung der Bildungsexpansion für die Ertragsraten von Bildungsinvestitionen und den Filtercharakter der Bildungsabschlüsse aufgezeigt wurde, lassen sich individuelle Erwerbsverläufe mit dem Anspruch einer dynamischen Sichtweise der Prozesse im Spannungsfeld von Individuum und Gesellschaft analysieren.

Abstract

The study presents recent labor market theories and applies them to the experiences of German and Polish employees during the post-war period. Human capital theory, search and efficiency wage theories, as well as the theory of labor market segmentation are combined with a cohort perspective to explain the dynamics of labor earnings over the life course. German and Polish life history data are used to distinguish three basic labor market processes: (1) wages at entry into the labor market, (2) wage changes at times of job change and (3) wage growth on-the-job.

The application of a historically incorporated comparison of results shows the mechanism of wage differentiation between men and women at entry into the labor market in West Germany. These wage differentials which occur at first entry into the labor market structure subsequent career patterns. Later job shifts can only partly compensate disadvantages experienced at earlier stages of the life course.

Labor earnings vary a lot between industrial sectors. Despite the fact that the level of wages is generally higher in Germany than in Poland, the basic structure of earnings trajectories across industrial segments in Poland during socialist rule was similar to the one found in advanced industrialized countries. Rates of return to cohort-specific human capital investments were generally higher in Germany during the post-war period.

The study developed and applied a dynamic socio-economic view of both the individual and society to explain labor market phenomena. The results based on retrospective life history data indicate the need for a historically incorporated cohort perspective to disentangle individual level, cohort and time period effects in the analysis of labor market processes. Concluding remarks advocate the application of a historically incorporated socio-economic analysis to evaluate labor market processes and policies trying to influence these processes.

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Neuere Arbeitsmarkttheorien und deren empirische Relevanz sind Gegenstand dieser vergleichend angelegten Längsschnittuntersuchung. Der Autor bringt diese Theorien in Zusammenhang mit der verstärkten kohortenspezifischen Prägung des Arbeitsmarktes. Anhand der Daten der Lebensverlaufsstudie des Max-Planck-Instituts für Bildungsforschung wird die Verteilung der Einkommen im Lebensverlauf in Deutschland und Polen untersucht. Die empirischen Ergebnisse verdeutlichen die Mechanismen, wie beispielsweise Einkommensunterschiede zwischen Männern und Frauen in Deutschland bereits mit dem ersten Arbeitsverhältnis auftreten und auch im weiteren beruflichen Werdegang kaum ausgeglichen werden. Des weiteren wird gezeigt, daß Einkommensverläufe zwischen Industriezweigen stark variieren. Trotz der erheblichen Unterschiede im Einkommensniveau erwies sich die Struktur der Einkommensverläufe nach Industriezweigen im noch sozialistischen Polen mit derjenigen entwickelter Industriegesellschaften westlicher Prägung als vergleichbar.