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Deutsches Institut für Wirtschaftsforschung

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**VOCATIONAL TRAINING AND JOB QUALITY:
CAREER ATTAINMENT IN THE GERMAN LABOR MARKET**

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INTRODUCTION

The German vocational education system has attracted widespread attention in debates over ways to how best prepare youth for participation in the labor market. A central element of the German system of vocational education is the dual system, which combines practical apprenticeship in a firm with part-time formal school attendance. This system has been argued to be relatively effective in providing workers with vocationally-relevant skills and training (Blossfeld, 1991). It is also intimately related to the nature of labor market segmentation in Germany, as well as to the mechanisms underlying career attainment (see Haller et al., 1985). It is commonly assumed that persons who participate in the vocational education system will obtain better jobs than those who do not, ceteris paribus. Yet this assumption has rarely been tested rigorously with data from representative samples that include persons entering the labor force in the past decade.

This paper examines the linkages between vocational training and career attainment in Germany, and we attempt to ascertain whether such training indeed "pays off" in terms of job quality. We first briefly describe the German vocational educational system. We next discuss our data and measures of key variables, particularly our monetary and nonmonetary measures of job quality. We then examine whether persons who have received vocational training obtain better jobs than persons without such training; we assess this by estimating a total effect of vocational training, as well as whether there is a direct effect of vocational training after other human capital factors and structural features of firms and labor markets have been taken into

account. We finally elaborate our model further to specify the extent to which job quality depends on whether one's vocational training "fits" one's job.

THE GERMAN VOCATIONAL EDUCATION SYSTEM

The contemporary German vocational system is closely linked to the labor market, and is often described as an outgrowth of the medieval system of guilds and chambers. This training system is also closely related to the regular secondary education system, which is divided into three basic tracks: *Hauptschule*, *Realschule* and *Gymnasium*; the latter is designed to lead toward higher education, while graduates of the two other tracks are expected to enter either a full-time vocational school or, as is more often the case, combine part-time vocational school with an apprenticeship (*das Duale System*). In the past twenty years, spurred by pedagogical and egalitarian concerns, the system has changed slightly to create further opportunities for mobility. These efforts have modified the vocational system somewhat, but far greater changes in the system were brought about by the demographics of the German baby boom and shifts in the proportions of younger cohorts following each secondary track.

The absolute number of young people in all facets of the vocational education system has grown drastically with the aging of the German baby boom cohorts. Though the proportion of each cohort entering vocational education has changed little in recent decades (50% to 60% of each cohort), relatively large cohorts in the late seventies and early eighties served to increase the demand for apprenticeship slots. The proportion of young people attending the *Gymnasium* and graduating with the degree necessary to enter the University

more than doubled between 1970 and 1985 (from 11.7% of those leaving school in 1970 to 26.4% of those leaving school in 1985). German policymakers tended to underestimate the pressures these large cohorts would have on the vocational education system, and were unable to anticipate that the proportion of *Gymnasium* graduates who did not plan to attend the University would increase from 10% to 40% during the same period (Bundesminister für Bildung und Wissenschaft 1980, 1987, 1989). Thus, the larger cohorts placed a burden on the system of vocational education as well as that of higher education.

The vocational education system grew rapidly to accommodate the increased demand and the number of young people in the system grew from 1,269,000 in 1970 to 1,831,000 in 1985. Nevertheless, the number of young people failing to find an apprenticeship grew dramatically and peaked at about 59,000 in 1985, after never exceeding 28,000 during the seventies. Only in 1988 did the unmet demand once again fall below 30,000. A number of studies have revealed that women, foreigners, the handicapped and those with degrees from the lowest high school track are disproportionately represented among those whose training needs are unmet.

During this time it also became apparent that the German vocational education system is a dual system, not only because it combines classroom and on-the-job instruction, but also because successful graduates are required to complete two transitions: into the training system and then out again into the labor force. Studies have found that individual characteristics such as family background and schooling affect the probability of a successful transition into employment. In addition, a number of structural features--including size and sector of the firm where the training was obtained, and general and regional fluctuations in the business cycle--have been shown to

affect the likelihood of obtaining a job after leaving vocational education. These studies have shown that completion of vocational training is also related to the probability of whether or not an individual finds employment (Helberger, Rendtel and Schwarze, 1991), as well as to initial entry and continued employment within specific segments of the labor market (Blossfeld and Mayer, 1987).

The analysis presented in this paper builds upon these previous studies, but goes beyond measures of career attainment that indicate simply whether or not an individual is employed and in which segment of the labor market. In particular, we adopt a multidimensional definition of job quality that takes into account both monetary and nonmonetary rewards. We examine whether or not persons with vocational training (in the dual system as well as in other kinds of vocational training) obtain better jobs than those without such training. We then consider whether any advantages associated with vocational training are due to the general skills associated with such education, or whether they are limited to those situations where people have jobs that enable them to use their vocational skills.

DATA

The primary data source used in our analyses is the German Socio-Economic Panel (SOEP), a nationally representative panel study of households (N = 5,021) and individuals (N = 16,000) that was started in West Germany in 1984. (An additional 2,179 East German households were added to the panel in 1990, after the borders were opened between the two countries but before economic and political reunification was consummated.) Survey instruments are designed to collect continuous records of employment, education, income,

program participation and household composition for the period of the panel. Measures of personal satisfaction and attitudes are obtained yearly in each interview. Retrospective components were also included in the early panel waves to provide educational, employment and marital histories, thereby countering the problem of left-censoring inherent in standard panel designs. This paper reports results based on waves one and two of the panel (1984 and 1985).¹

MEASUREMENT OF VARIABLES

In this section, we describe measures of our dependent and independent variables. Means and standard deviations of these variables are presented in Table 1.

-- TABLE 1 ABOUT HERE --

Vocational Training

The SOEP data provide information on whether a respondent was engaged in any vocational training or schooling.² The data also distinguish nine different types or levels of education (e.g., apprenticeships, trade schools, technical colleges and universities). Rather than simply looking at the effects of all types of vocational education combined, our analysis will use two dummy variables that indicate whether the respondent completed a course of

¹ A subsequent version of this paper will add data from additional panel waves.

² The SOEP data clearly indicate in each wave whether or not the respondent had completed a course of vocational training in the previous year and the exact type of training involved. Retrospective information on participation in vocational training, including years in which an individual was engaged in an apprenticeship, is also available in the life history data collected during the first wave. However, the occupation in which training occurred is not specified in the retrospective data.

instruction in the dual system, and/or whether he/she obtained another form of initial vocational training. The latter category contains a variety of primarily school-based courses of vocational training, including:

Berufsfachschulen (full-time schools for persons without any prior vocational training); and *Schulen des Gesundheitswesens* (full-time schools providing preparation for nonacademic health service occupations such as nurses, midwives, and occupational therapists). Attendance at a *Fachschule*--a full- or part-time school that provides further master or technical certification for persons who have completed vocational training and have considerable occupational experience--is not included in the "other" vocational training category, since this is a form of continuing education and not initial vocational training, which is our focus in this paper.

Among employed persons in this sample, 55.6 percent of men and 42.5 percent of women had participated in the dual system. Approximately 70 percent of the men who had been in the dual system had been trained in apprenticeships in the trades and industry as opposed to commercial apprenticeships. These proportions are reversed among women: only 26 percent of the women had been trained in the trades and industry, while 74 percent had completed commercial apprenticeships. An additional 6.0 percent of men and 12.6 percent of women participated in other vocational education. About one-third of the women in this "other" group had been trained in the health service occupations, where school-based instruction of this type is the standard form of vocational training. The remainder of the women and the vast majority of men with other forms of vocational education are likely to enter labor markets where they will have to compete with graduates of the dual system.

Fit between Training and Employment

Are there positive effects of training on job quality even if the individual is not working in the occupation for which he or she has been trained? Does vocational training primarily increase a person's general skills, regardless of whether he/she actually uses these skills on the job? Or, alternatively, does vocational training pay off primarily in those cases where the person is able to obtain a job that makes use of the training he/she has obtained? In order to assess better the mechanisms by which vocational training enhances job quality, we also examine the importance of the fit between training and jobs.

Establishing the degree of fit between training and jobs necessarily involves some ambiguity. Clearly, training as a baker provides few specific occupational skills that may be used by a plumber. However, in many cases the issue is not so clear cut: for example, training as an auto mechanic may turn out to be quite relevant for later employment as a car salesman.

One solution to the problem of ambiguity is to rely on the respondents' subjective assessments of fit.³ In the first wave of SOEP interviews, respondents were asked whether or not they are currently working in the occupation in which they were trained. This question is then repeated in subsequent waves for all respondents who indicated that they had experienced a job shift in the previous year, even in the case of an intrafirm job shift.

Assessing the consequences of fit enables us to achieve a major goal of this paper, which is to separate two analytically distinct ways in which the

³ Specific information about the occupation in which training occurs is only available for respondents who completed their training in the course of the panel. For an expanded discussion of the measurement of "fit" in these data, and an analysis of its determinants, see Witte and Kalleberg, 1992.

dual system and other forms of German vocational training facilitate the attainment of higher income and greater intrinsic rewards. First, socialization into the worker role and the acquisition of general employee skills may lead to benefits associated with participation in vocational education regardless of whether the training is used on the job. This is reflected by the strength and significance of the coefficients associated with the vocational education terms in our equations. Second, it may be that vocational training only provides monetary and nonmonetary rewards if the occupational skills obtained from such training are in fact used on the job. We interpret the size of the coefficients attached to the "fit" terms--relative to the effects of vocational education--as indicating the extent to which the German vocational education system provides returns to specific occupational skills.

Job Quality

People seek to obtain monetary as well as nonmonetary rewards from their jobs. Accordingly, we adopt a multidimensional approach to assessing job quality (see also Jencks, Perman, and Rainwater, 1988). We measure monetary rewards by (the natural log of) monthly earned income, which is reported by each respondent on a yearly basis for the month prior to the interview date. Our analysis uses net reported income, that is take-home pay after deductions for taxes, pension contributions and unemployment and health insurance.

Our measure of the nonmonetary aspects of job quality (intrinsic rewards) is based on responses to several questions concerning the specifics of a person's employment that were asked at three points in time (years two, four and six):

We would like to know more about your work and working conditions. Characterize the following statements as completely accurate, somewhat accurate or inaccurate:

1. Your employment offers variety.
2. Your employment requires physically demanding labor.
3. You can independently determine the course and conduct of your work.
4. Your hours vary with the firm's business volume.
5. Your performance is strictly controlled.
6. Your working hours (shift) change.
7. You regularly work nights (between 10 p.m. and 6 a.m.).
8. You often argue or have conflict with your supervisor.
9. You get along well with your coworkers.
10. You are involved in compensation and promotion decisions concerning your coworkers.
11. You are always able to learn something on the job that is useful for career advancement.
12. You are subject to burdensome environmental influences on the job.
13. Your work entails severe mental stress.

Oblique and orthogonal factor analyses of these items indicated that five of them (items 1, 3, 5, 10 and 11) form a single factor, which we label "intrinsic rewards".⁴ We assume that these employment conditions characterize "good jobs," since most employees prefer jobs that offer variety, autonomy, decision-making authority and opportunities for career advancement. The best jobs provide both high incomes and intrinsic rewards, while the worst positions provide little in the way of either monetary or nonmonetary rewards. Managers, government administrators, architects, engineers, insurance and real estate salesmen, and clerical supervisors were among the SOEP respondents most likely to report both high incomes and high levels of intrinsic rewards. At the other end of the scale, maids, launderers, tailors, retail sales personnel, shop assistants, tobacco processors and rubber workers were among

⁴ This factor had an eigenvalue of 2.047. The loadings of the five intrinsic reward indicators on this factor were: variety (.73), independence (.72), control (.46), decision-making (.61), and learn (.63).

those most likely to report both low incomes and few intrinsic rewards. Mean levels of income and intrinsic rewards for broad occupational groups in the SOEP sample are summarized in Tables 2 (men) and 3 (women). Even at this level of aggregation, clear differences are present between occupational groups in both monetary and nonmonetary rewards.

-- TABLES 2 AND 3 ABOUT HERE --

A major advantage of our multidimensional conceptualization of job quality is that we are able to examine the extent to which people "trade-off" the attainment of one type of job reward for another. The correlation between a person's income and intrinsic rewards in these data is .242, which indicates that there are indeed trade-offs occurring between the two kinds of rewards. Some employees may be willing (or forced) to sacrifice intrinsic rewards for higher incomes; or, viewed from the perspective of the firm, it may be necessary for employers to offer relatively high incomes to fill jobs that provide little in the way of variety, autonomy and decision-making authority. Jobs of this type in the SOEP data include: miners, wood preparation workers, chemical processors, textile workers and transport equipment operators. Conversely, individuals may be willing to accept relatively low incomes, if the nonmonetary rewards associated with the job are high. In this case employers may be able to pay lower incomes because of the high intrinsic rewards associated with the job, as in the case of farmers and forestry workers, restaurant and sales managers, sales proprietors and hairdressers. Trade-offs are illustrated by levels of income and intrinsic rewards in manufacturing occupations (see Table 2): on average, men in skilled manufacturing jobs received essentially the same income as those in unskilled

manufacturing jobs; however, persons in skilled positions were clearly better off with regard to intrinsic rewards. This trade-off is even more striking among women (see Table 3): unskilled workers actually take home more pay than skilled workers, but the intrinsic rewards for those in skilled positions are significantly higher.

Human Capital and Other Characteristics of Individuals

Vocational education represents one important form of human capital, or investments that enhance a person's productive capacity. Other kinds of human capital investments--such as formal education--should also be taken into account in order to explain adequately the attainment of job rewards. Universities and technical colleges in Germany are distinctly separate from the vocational education system, and students who had attended these institutions are often left out of analyses of the German vocational education system. This is problematic since students at these institutions acquire labor market advantages that enhance their ability to achieve good jobs. Ignoring respondents with university degrees may also distort estimates of the impacts of vocational training, especially since growing numbers of *Gymnasium* graduates are both completing a course of vocational education and attending the university.

Another source of human capital is experience, which we measure by: an individual's total work experience; tenure at current place of employment; and months unemployed. Persons with more experience are, ceteris paribus, more likely to have acquired greater skills and thus be able to obtain more highly rewarding jobs. However, the association of high job rewards with greater experience does not simply reflect returns to human capital: tenure and

experience provide workers with greater control over uncertainties and other forms of individual power that they can use to obtain better jobs.

An additional characteristic of individuals is whether or not the respondent is a German. We expect that Germans will have a variety of comparative advantages over non-Germans in the labor market, and that these advantages will translate into better jobs.

Finally, we include a measure of the usual number of hours a person works in a week. This indicates how much labor a person supplies to the market (and thereby affects one's income) as well as reflects one's commitment and motivation to work.

Structural Position in the Labor Market

Research by sociologists and economists during the past several decades has shown conclusively that a person's level of job rewards depends on his/her location in the labor market as well as on his/her human capital and other individual characteristics. Labor market location can be represented by a variety of work structures, including: occupation; industry; firm size; and union membership. We adopt a multidimensional approach to labor markets, and include measures of all of these work structures in our models that seek to explain inequalities in job rewards (see also Carroll and Mayer, 1984; 1986; Kalleberg and Berg, 1987).

RESULTS

We report the results of two major sets of analyses: 1) reduced form and direct effects of vocational training on job quality for men (Table 4) and women (Table 5); and 2) the effects on job quality of the "fit" between the

vocational training received and subsequent employment (Table 6).

-- TABLES 4 AND 5 ABOUT HERE --

Effects of Vocational Training on Job Quality

Do persons with vocational training actually obtain jobs with more monetary and nonmonetary benefits than persons without such training? We assume that they do, based on the results of previous studies of the effects of vocational training on achievement in Germany. If this is indeed the case, we will then seek to assess the degree to which the effects of vocational training are explained by other human capital variables or by labor market location.

Our models may be represented by equations 1 and 2, which we estimate separately for men and women:

$$JQ_t = b_0 + b_1HC + b_2VT \quad (1)$$

$$JQ_t = b_0 + b_1HC + b_2ST + b_3VT \quad (2)$$

In these equations, the term VT consists of two dummy variables indicating the two main types of vocational training (dual system, or other).⁵ We assess

⁵ If, as some authors suggest, there has been a continued decline in the importance of vocational training during the eighties, then the value of the coefficient b_3 , which captures the amount of job quality that may be attributed to vocational training, should decrease in later waves. This would represent a period effect indicating a decline in the importance of vocational training at the macro level. The role played by vocational education at the individual level may also diminish over time: skills associated with job tenure and overall work experience are likely to play a relatively greater role in an individual's overall set of job skills. In the models above, this "aging" or "career" effect at the individual level would be captured by linear and/or quadratic measures of job tenure and work experience. In future work, which will utilize the full

the extent to which the effects of vocational training on job quality are explained by structural location in the labor market by comparing the coefficient b_2 in equation 1 with coefficient b_3 in equation 2.

Intrinsic Rewards. The first column in Tables 4 (men) and 5 (women) presents the results obtained from regressing the intrinsic reward index on the vocational education and human capital/individual variables. The effects of the individual characteristics are consistent with our expectations: German citizens, persons who attended the two higher forms of secondary schooling, and university graduates had significantly higher intrinsic rewards than resident aliens, dropouts and graduates of the lowest secondary track and those without a university degree. Men and women who had more experience on the job and who usually worked more hours also reported that their jobs were more intrinsically rewarding. The only significant differences between men and women in the effects of these variables on intrinsic rewards is in the greater explanatory value of hours worked for women than for men.⁶

Training in the dual system and in "other" forms of vocational education is also positively associated with intrinsic rewards (there is no statistically significant difference in the intrinsic rewards between those who participated in the two types of vocational education). In addition, the magnitudes of the effects of both forms of vocational education are far less than that of a university degree (especially for men). While the effects of a

panel data set, we will also consider "period" effects.

⁶ We tested for gender differences by pooling male and female respondents and adding terms to represent the main effects of gender and all possible gender interaction terms. This is equivalent to estimating models separately by gender and then comparing male- and female-specific coefficients.

university degree on intrinsic rewards are approximately the same for men and women, the payoff to dual system participation is significantly greater for women than men.

The second column in Tables 4 and 5 adds individuals' work structural characteristics in order to assess the extent to which the total effects of vocational education (and the other individual characteristics) are mediated by labor market structures (see equation 2 above). The overall fits of these models are clearly better than the reduced form models. Most of the significant coefficients in the reduced form model remain significant, but their impacts are drastically reduced, indicating, for example, that individuals with particular types of human capital receive greater intrinsic rewards because they are able to attain advantageous positions within the labor market.⁷

The declines in the vocational education coefficients from columns 1 to 2 suggest that the nonmonetary benefits of training are due in part to the ability of vocational education participants to enter occupations that offer greater intrinsic rewards.⁸ We find this pattern for both dual system participants as well as those who obtained other forms of vocational

⁷ There are two differences between men and women in intrinsic reward inequalities among occupational groups: the difference in intrinsic rewards between the reference group (persons working in skilled manufacturing occupations), on the one hand, and professional/technical/administrative occupations and unskilled manufacturing occupations, on the other, is greater for women than for men. In addition, though intrinsic rewards are positively correlated with occupational prestige for both men and women, the effect is significantly stronger for men than women.

⁸ Simply adding firm size to the model significantly improves the overall fit of the model but has very little impact on the two vocational education coefficients. This suggests that the indirect effects of vocational education are primarily achieved by sorting/selecting individuals into particular occupations rather than toward smaller firms.

education. The direct (as well as total) effect of dual vocational education is significantly greater for women than men, though it is positive for both groups. The effect of "other" vocational training is positive for both men and women (but not significantly different between them). In addition, the slightly larger coefficients for the direct effect of dual system as opposed to other forms of vocational education are not significantly different for men ($t=0.62$) or women ($t=1.11$).

Income. Columns 3 and 4 in Tables 4 (men) and 5 (women) present results of our analysis of income differences. By contrast to our analysis of intrinsic rewards, we find a greater number of significant gender differences in the effects of individual characteristics; in both the reduced form and the direct effects models, the individual characteristics' coefficients tend to be stronger for women than men. Most notably, secondary school track affects earned income of women but not of men; women who graduated from the two higher forms of secondary schooling earn more than women with no degree or a degree from the lowest form. Overall work experience and, in particular, hours worked are significantly more strongly related to women's income than men's (most likely this is due to these varying considerably more for women than men--see means and standard deviations in Table 1). However, while men's income is positively affected by years on the job, the income of women does not systematically vary with job tenure. Surprisingly, for men--and even more so for women--the effect of German citizenship is negative and significant even after structural variables are included in the model.

Other variables have similar effects for males and females. Both men and women who are university graduates are better paid, even after controlling

for occupational group and occupational prestige. Civil service training is also associated with higher income for both males and females, though some of this difference is eliminated (especially for women) if the person works in the public sector.

In general, the income effects of the work structural characteristics conform to the pattern expected given employer and employee trade-offs between income and intrinsic rewards. Persons who work in larger firms earn more, though the economic advantages of working in larger organizations are greater for women (for similar results in the United States, see Kalleberg, Wallace, and Althauser, 1981). By contrast, employment in larger firms is associated with lower intrinsic rewards (see column 2 in Tables 4 and 5). Similarly, male workers in unskilled manufacturing jobs have less variety, autonomy and authority than men in skilled manufacturing positions. But, all other things equal, male workers in unskilled manufacturing jobs are actually better paid than men in skilled jobs. Indeed, looking at the other occupational groups, skilled manufacturing jobs are at the bottom of the income distribution for men.⁹ At the other extreme, men in professional, technical and administrative occupations receive the highest monetary rewards. But, according to the second column in Table 4, men in professional, technical and administrative positions are no better off with regard to intrinsic rewards than men in clerical and service occupations. Men working in sales receive only slightly higher monetary rewards than men in skilled manufacturing positions, but men in sales positions perceive they have a far greater degree

⁹ The category of miscellaneous occupations shares the bottom of the income distribution along with that of skilled manufacturing occupations. In terms of intrinsic rewards, however, the miscellaneous category is at the top end of the distribution. In large measure this is due to the fact that the farmers make up the largest group within the miscellaneous category.

of variety, autonomy and decision-making authority.

Men and women who participated in the dual system, as well as those who had "other" forms of vocational education, reported that they received higher earnings than those without vocational education. Moreover, the economic advantages of vocational education participation were not fully explained by the measures of work structures (which is similar to our results for intrinsic rewards): work structural characteristics accounted for only part of the income effects of both types of vocational education; a significant positive effect of participation in training remained after controlling for occupational and industry groups, occupational prestige, union membership, and firm size. However, once work structural characteristics are included in the model, the direct effect of the dual system is significantly stronger than the coefficient for "other" forms of vocational education, for both men ($t=3.19$) and women ($t=2.75$).

THE FIT BETWEEN TRAINING AND JOBS

Does vocational training enhance a person's ability to obtain high quality jobs regardless of whether he/she actually uses these skills on the job? To test the importance of fit for job quality, we now include a term that represents whether or not there is a good fit between training and employment. As we discussed above, our measure of fit is based on respondents' subjective determination of whether or not they have been trained for the occupation in which they are currently engaged. This model is represented by equation 3:

$$JQ_t = b_0 + b_1HC + b_2ST + b_3VT + b_4FIT \quad (3)$$

In this model the term FIT represents two dummy variables: the first takes the value of one for those who participated in the dual system and reported that they are working in the field in which they have been trained; the second takes the value of one for those who participated in "other" forms of vocational education and reported that they are working in their field of training. If vocational training primarily enhances job quality in those cases where individuals are employed in the areas in which they have been trained, then the effects we earlier attributed to the term b_3VT in equation 2 should shift, to a large extent, to the term b_4FIT . If, on the other hand, vocational training has strong general effects on job quality, then the term b_3VT should retain its significance regardless of the value of FIT.

It is difficult to anticipate whether the effects of fit will differ for monetary as opposed to nonmonetary rewards. A good fit between training and employment may be strongly tied to the intrinsic rewards derived from the opportunity to use one's training. But, income may also be influenced by the degree of fit between training and employment: if employers highly value specific job skills acquired through vocational education, then employees who have been trained for their jobs should be better compensated than those who were trained in a different field.

Looking first at intrinsic rewards, the first two columns in Table 6 indicate that neither type of fit is statistically significant for either

-- TABLE 6 ABOUT HERE --

men or women. Adding the fit variables to the model reduces the main effects of both forms of vocational education, but there is little evidence that a

good match between training and employment brings greater intrinsic rewards.¹⁰ After adding the fit terms to the model the direct effect of "other" forms of vocational education on intrinsic rewards for men is significant at a p-value of only .06. The dual system, on the other hand, still appears to provide general skills that lead to higher intrinsic rewards, though such rewards are unrelated to whether the person works in the field in which he/she has been trained.

Column 3 in Table 6 indicates that there is no effect of fit on income for male dual system participants, though there is a significant positive effect of fit on income for both men and women (column 4) who participated in "other" forms of vocational education. In fact, when fit is included in the model, the main income effect of "other" forms of vocational education vanishes altogether. This suggests an important difference between dual system participation and other forms of vocational education for men: employers pay more for the general skills acquired by dual system participants, while higher pay for other forms of vocational education is more closely tied to skills specific to the training area. For women, adding the fit variables reduced the main effects of both major types of vocational education on income. The resulting coefficients also support an argument for a positive income effect due to general skills for dual system participants but not for those with other forms of vocational training. By contrast to the results for men, fit with regard to both kinds of vocational education

¹⁰ Though conceptually it is reasonable to include the fit terms in the models for both job rewards, statistically the intrinsic rewards models are not improved by adding the two fit variables. For both men and women, the changes in the F-statistics of the expanded intrinsic reward models relative to the simpler models (column 2 in Tables 4 and 5) are not large enough to clearly indicate a reduction in residual model variance.

positively enhance women's incomes.

Our analysis suggests two plausible interpretations--related to large differences in male and female labor markets in Germany--of why fit might influence the incomes of female but not male dual system participants. First, if one distinguishes skills developed through formal training and skills developed on the job as two primary types of human capital, it is likely that the relative importance of the former decreases and that of the latter increases with greater work experience. Since women on average have less work experience than men, one would expect that formal credentials play a greater role in determining the incomes of women than men. For example, Tables 4 and 5 indicate that secondary school track is more strongly related to incomes of women than men. The stronger association between fit and income among women may be another way in which the labor market for German women is more closely tied to formal credentials than it is for men. Second, the proportions of men and women in the various occupational groups (see Table 1) indicates that their representation in the German occupational structure is quite different. There is considerable gender variation within each of the major occupational groups as well: for example, over 70 percent of all women in "sales" occupations are employed as sales clerks and shop assistants, compared to only 18 percent of all men in sales occupations (which is a much smaller group to begin with). In general, there is a considerable degree of occupational sex segregation in Germany and, as Table 7 indicates, this pattern characterizes the dual system as well. In nineteen of the twenty-five most common courses of vocational training in the dual system, 75% percent or more of the

-- TABLE 7 ABOUT HERE --

apprentices are of the same gender. Closer analyses of the gender-based occupational structure of the German labor market and vocational education system are required in order to understand more fully the implications of gender differences in the correlates and consequences of fit.¹¹

CONCLUSIONS

This paper has examined how vocational education affects the process of career attainment in the German labor market. We have sought to give an American audience a better understanding of how the German vocational education system operates. Moreover, our analytic strategy was designed to assess the process whereby vocational training contributes to job quality. We have examined the extent to which the effects of vocational training are mediated through human capital factors and structural features of labor markets and firms, as well as the importance of fit between training and employment.

Our analyses suggest several main conclusions. First, participation in both major types of vocational education--the dual system and "other" forms of vocational training--is positively and directly related to both monetary and nonmonetary aspects of job quality, as measured by earned income and intrinsic rewards (variety, autonomy, decision-making authority and opportunities for career advancement). The relationship between vocational education and job quality holds for men as well as women.

¹¹ The analysis here suggests that men and women experience very different financial incentives to make use of their training. For example, the results in Table 6 suggest that the financial benefits for a man with vocational training to move from an unskilled job to a skilled job are relatively minor (increasing earnings from DM 1,835 to DM 1,897 a month). For a woman, however, the predicted benefits of taking a skilled job that makes use of her training are considerable (increasing earnings from DM 1,026 to DM 1,291 a month).

Second, work structures, especially occupational group and occupational prestige, reduce the impact of both types of vocational education on job rewards. In particular, the mediating influence of these work structural characteristics accounts for a relatively large portion of the effect of "other" forms of vocational education on earnings. Though there is still a significant and positive direct effect of "other" forms of vocational education on income, the payoff is significantly less than that of the dual system for both men and women, once work structural factors are included the model.

Third, "fit" between training and employment, regardless of whether the training was acquired through the dual system or "other" forms of vocational education, does not affect intrinsic rewards of men or women. Thus, individuals working in the area in which they have been trained do not report greater intrinsic rewards than persons who are not using their training in their current employment. Nevertheless, once fit is included in the model there still appears to be a main effect of vocational education on intrinsic rewards. This is certainly true for those who participated in the dual system, and possibly also for those who participated in "other" forms of vocational education.

Finally, fit between training and jobs affects the incomes of men and women who participated in "other" forms of vocational education. Indeed, "other" forms of vocational education only appear to increase earnings when persons with training of this type are employed in the field in which they are trained. Those who acquired their training through the dual system, on the other hand, are paid more regardless of the fit between training and employment. In addition, women who participated in the dual system report

even greater earnings if their training fits their current employment, while fit is unrelated to the earnings of men who participated in the dual system.

The analyses reported in this paper represents a first step, albeit an important one, toward an improved understanding of the linkages between vocational education and career attainment in the German labor market. We expect to obtain further insights into these processes by extending our analysis to include the additional waves of the SOEP data.

Kalleberg, Arne L., Michael Wallace, and Robert P. Althausen. 1981. "Economic segmentation, worker power, and income inequality." American Journal of Sociology 87:651-683.

Witte, James C. and Arne L. Kalleberg. 1992. "Matching training and jobs: Lessons from the German vocational education system." Paper presented at the Population Association of America Annual Meetings. Denver, 1 May 1992.

Table 1: Means and Standard Deviations for Analysis of Job Quality Measures, Individual and Structural Independent Variables

Job Quality	Men		Women	
	Mean	SD	Mean	SD
Mean income (DM/month)	2182	(1213)	1174	(653)
Intrinsic rewards	5.25	(2.37)	4.73	(2.26)
Individual characteristics				
German citizenship	.70	(.46)	.76	(.42)
Realschule degree	.15	(.37)	.25	(.43)
Gymnasium degree	.10	(.29)	.09	(.28)
University degree	.10	(.30)	.07	(.25)
Civil service training	.06	(.23)	.02	(.13)
Work experience (years)	17.59	(11.67)	10.74	(9.57)
Years on the job	11.16	(9.25)	8.06	(7.84)
Months unemployed (last 10 yr)	1.61	(6.85)	1.86	(7.53)
Usual hours worked	42.73	(12.00)	34.31	(13.08)
Work structural characteristics				
Firm size: < 20 employees	.21	(.40)	.29	(.45)
Firm size: 20 - 199 employees	.26	(.44)	.27	(.44)
Firm size: 200-1,999 employees	.22	(.41)	.22	(.41)
Firm size: > 1,999 employees	.31	(.46)	.22	(.42)
Employed in public sector	.22	(.41)	.27	(.44)
Union membership	.43	(.50)	.23	(.42)
Treiman score for occupation	39.51	(11.62)	37.68	(11.86)
Prof, tech. admin. occupations	.14	(.35)	.14	(.35)
Clerical occupations	.13	(.34)	.32	(.47)
Sales occupations	.05	(.22)	.10	(.31)
Service occupations	.06	(.23)	.17	(.38)
Unskilled mfg. occ.	.13	(.34)	.09	(.28)
Semi-skill mfg. occ.	.09	(.28)	.03	(.18)
Skilled mfg. occ.	.36	(.49)	.13	(.26)
Miscellaneous occupations	.04	(.20)	.02	(.14)
Vocational Education				
Dual system	.45	(.50)	.37	(.48)
Other vocational education	.10	(.30)	.14	(.36)
Fit - dual system	.24	(.43)	.21	(.40)
Fit - other voc. education	.06	(.23)	.08	(.30)
N of cases	3,048		1,733	

For the first five individual characteristics, all of the work structural characteristics except the Treiman score, and all of the vocational education variables the mean indicates the proportion of men and women with the characteristic.

Table 2: Income, Intrinsic Rewards and Vocational Education According to Occupational Group
Male Respondents, Wave 2 of the German Socio-Economic Panel (1985)

Occupational Group	Mean Value				Proportion of occupational group			
	Aftertax income DM/month	Average Hours Worked	Intrinsic Rewards	Treiman Prestige Score	Dual System	Other Vocational Education	Fit Dual System	Univer- sity Degree
Admin/tech/prof (n=456)	3,236	44.7	6.91	59	.38	.12	.23	.58
Clerical (n=405)	2,316	41.5	6.05	43	.59	.13	.28	.11
Sales (n=169)	2,503	45.8	6.31	43	.70	.16	.37	.10
Service (n=185)	2,201	46.3	5.83	34	.49	.17	.14	.03
Unskilled manufacturing (n=413)	1,870	42.3	4.18	28	.53	.10	.10	---
Semi-skilled manufacturing (n=277)	1,961	42.0	4.51	35	.52	.12	.18	.01
Skilled manufacturing (n=844)	1,957	42.2	5.55	37	.68	.12	.49	.01
Miscellaneous (n=134)	1,892	52.4	6.88	31	.60	.12	.06	.06

Table 3: Income, Intrinsic Rewards and Vocational Education According to Occupational Group
Female Respondents, Wave 2 of the German Socio-Economic Panel (1985)

Occupational Group	Mean Value				Proportion of occupational group			
	Aftertax income DM/month	Average Hours Worked	Intrinsic Rewards	Treiman Prestige Score	Dual System	Other Vocational Education	Fit Dual System	Univer- sity Degree
Admin/tech/prof (n=270)	1,700	34.5	6.04	55	.19	.30	.13	.36
Clerical (n=580)	1,276	32.5	5.39	41	.62	.20	.34	.03
Sales (n=193)	991	34.8	5.51	37	.64	.07	.33	.02
Service (n=312)	868	31.1	4.71	27	.31	.12	.12	---
Unskilled manufacturing (n=155)	1,032	34.2	3.45	30	.14	.09	---	---
Semi-skilled manufacturing (n=62)	881	30.8	4.18	29	.39	.05	.19	---
Skilled manufacturing (n=58)	839	35.1	4.61	39	.64	.16	.49	---
Miscellaneous (n=387)	965	42.7	5.77	35	.27	.15	.21	.04

Table 4: OLS Unstandardized Regression Coefficients for Intrinsic Rewards and After-Tax Income Regressed on Individual and Structural Independent Variables - Male Respondents

Independent Variables	Intrinsic rewards		Net income	
	[1]	[2]	[3]	[4]
Individual Characteristics				
German citizenship	1.277**	.967**	-.081**	-.085**
Realschule degree	.730**	.364**	.045	-.031
Gymnasium degree	.468*	.087	.068	-.001
University degree	1.338**	.653**	.630**	.402**
Civil service training	.041	.086	.245**	.214**
Work experience (years)	-.001	.003	.010**	.010**
Years on the job	.031**	.026**	.008**	.006**
Months unemployed (last 10 years)	-.008	-.008	-.001	.001
Usual hours worked	.036**	.025**	.004**	.004**
Work structural characteristics				
Firm size: 20 - 199 ¹		-.869**		.119**
Firm size: 200-1,999		-.957**		.193**
Firm size: > 1,999		-1.056**		.191**
Employed public sector		-.309**		-.091**
Union membership		.093		.040*
Treiman score for occ.		.033**		.008**
Prof/tech/admin. occ.		.639**		.178**
Clerical occupations		.617**		.073**
Sales occupations		.829**		.084*
Service occupations		.587**		.093*
Unskilled mfg. occ.		-.622**		.072**
Semi-skill mfg. occ.		-.243		.066*
Misc. occupations ²		1.013**		-.040
Vocational Education				
Dual system	.490**	.403**	.194**	.189**
Other vocational ed.	.403**	.317**	.100**	.084**
Constant	1.972	2.124	7.047	6.570
R ²	.271	.361	.250	.307
N of cases	3,048		3,048	

* p < .05; ** p < .01. 1) Reference group consists of firms with fewer than 20 employees. 2) Reference group consists of skilled manufacturing occupations.

Table 5: OLS Unstandardized Regression Coefficients for Intrinsic Rewards and After-Tax Income Regressed on Individual and Structural Independent Variables - Female Respondents

Independent Variables	Intrinsic rewards		Net income	
	[1]	[2]	[3]	[4]
Individual Characteristics				
German citizenship	1.419**	.939**	-.234** ^a	-.241** ^a
Realschule degree	.502**	.200	.157** ^a	.063 ^a
Gymnasium degree	.738**	.406	.327** ^a	.216** ^a
University degree	1.326**	.619*	.562**	.371**
Civil service training	.384	.386	.455** ^a	.219*
Work experience (years)	.003	.006	.015**	.014** ^a
Years on the job	.019*	.019**	.001 ^a	-.001 ^a
Months unemployed (last 10 years)	-.002	.001	.001	.001
Usual hours worked	.017** ^a	.019** ^a	.019**	.018** ^a
Work structural characteristics				
Firm size: 20 - 199 ¹		-.919**		.187**
Firm size: 200-1,999		-1.033**		.287** ^a
Firm size: > 1,999		-.969**		.329** ^a
Employed public sector		-.043		.067 ^a
Union membership		-.056		.071*
Treiman score for occ.		.025** ^a		.004** ^a
Prof/tech/admin. occ.		1.401** ^a		.123
Clerical occupations		1.022**		.046
Sales occupations		1.002**		-.119** ^a
Service occupations		.965**		-.149** ^a
Unskilled mfg. occ.		.108 ^a		-.074 ^a
Semi-skill mfg. occ.		.231		.044
Misc. occupations ²		1.546**		-.199** ^a
Vocational Education				
Dual system	.889** ^a	.698** ^a	.221**	.219**
Other vocational ed.	.783**	.521**	.177**	.099*
Constant	2.146	1.590	6.122	5.886
R ²	.245	.341	.313	.409
N of cases	1,733		1,733	

* p < .05; ** p < .01. 1) Reference group consists of firms with fewer than 20 employees. 2) Reference group consists of skilled manufacturing occupations.

^a indicates a male-female difference significant at the .05 level.

Table 6: OLS Unstandardized Regression Coefficients for Intrinsic Rewards and Income Regressed on Fit, Individual and Structural Independent Variables

Independent Variables	Intrinsic rewards		Net income	
	Men	Women	Men	Women
Individual Characteristics				
German citizenship	.978**	.937**	-.082**	-.236** ^a
Realschule degree	.356**	.207	-.036	.067** ^a
Gymnasium degree	.081	.415	-.002	.215** ^a
University degree	.635**	.623*	.400**	.391**
Civil service training	.072	.379	.213**	.207*
Work experience (years)	.004	.006	.010**	.014** ^a
Years on the job	.025**	.019**	.005**	-.002 ^a
Months unemployed (last 10 years)	-.008	-.001	.001	.001
Usual hours worked	.025**	.019**	.004**	.018** ^a
Work structural characteristics				
Firm size: 20 - 199 ¹	-.864**	-.923**	.121**	.194**
Firm size: 200-1,999	-.942**	-1.035**	.198**	.288** ^a
Firm size: > 1,999	-1.041**	-.974**	.194**	.338** ^a
Employed public sector	-.298**	-.055	-.084**	.072** ^a
Union membership	.099	-.056	.041*	.075*
Treiman score for occ.	.033**	.025** ^a	.008**	.004** ^a
Prof/tech/admin. occ.	.670**	1.394** ^a	.185**	.091
Clerical occupations	.642**	1.031**	.083**	.037
Sales occupations	.853**	1.015**	.095*	-.120** ^a
Service occupations	.617**	.966**	.111**	-.144** ^a
Unskilled mfg. occ.	-.592**	.104 ^a	.084**	-.066 ^a
Semi-skill mfg. occ.	-.220	.236	.073*	.043
Misc. occupations ²	1.032**	1.567**	-.034	-.200** ^a
Vocational Education				
Dual system	.292**	.802** ^a	.166**	.145**
Other vocational ed.	.331	.433*	-.012	-.066
Fit-dual system	.201	-.194 ^a	.045	.127**
Fit-other voc. ed.	-.036	.155	.161**	.182**
Constant	2.113	1.584	6.568	5.896
R ²	.362	.342	.311	.415
N of cases	3,048		1,733	

* p < .05; ** p < .01. 1) Reference group consists of firms with fewer than 20 employees. 2) Reference group consists of skilled manufacturing occupations.

^a indicates a male-female difference significant at the .05 level.

Table 7: The 25 Most Common Apprenticeships in Germany (1988)

Apprenticeship Title	Rank	Total Number	Percent women
Automobile mechanic	1	75,115	1.1
Retail sales	2	66,331	65.1
Industrial sales	3	65,658	62.7
Hair dresser	4	61,922	93.6
Office employee ¹	5	59,391	80.6
Bank employee	6	55,251	52.4
Wholesale sales	7	50,193	43.7
Electrician	8	46,877	1.1
Grocery sales	9	45,597	98.8
General sales	10	44,210	79.6
Physician's Assistant	11	44,006	99.9
Industrial mechanic	12	40,620	1.7
Carpenter	13	31,947	9.2
Painter	14	31,768	9.0
Dental assistant	15	30,508	99.9
Plant mechanic	16	28,063	1.6
Cook	17	25,935	28.1
Plumber	18	25,740	0.9
Baker	19	25,514	17.0
Energy electrician	20	25,278	2.1
Specialized office help	21	23,303	81.9
Machine fitter	22	21,993	1.0
Hotel trade	23	20,811	90.5
Office employee ²	24	18,447	78.7
Gardener	25	18,353	39.4

Source: Grund- und Strukturdaten 1989/90. Bundesminister für Bildung und Wissenschaft. 1 Office employee in industry and commerce. 2 Office employee in the crafts and trades.