

APPRENTICESHIP AND AFTER: DOES IT REALLY MATTER?

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ABSTRACT

Apprenticeship and After: Does it Really Matter?*

Using data from the German socio-economic panel this paper analyses the labour market entrance of former apprentices, as well as of university and full-time school graduates. There are three main findings. First, the retention rate of apprentices in their training firms is fairly low. Second, the transition to employment involves unemployment periods for many individuals, and two out of three first employment spells end within five years. Third, the main determinant for post-apprenticeship tenure is firm size of the training company. The expected tenure is the same for individuals staying with their training firm and individuals moving jobs. The findings reveal that apprenticeship training is a less secure way to stable employment than is often assumed. Also, they cast doubt on standard human capital explanations of apprenticeship training.

JEL Classification: J2, J6

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NON-TECHNICAL SUMMARY

In this study I use data on individual schooling and employment histories drawn from the German Socio-Economic Panel (GSOEP) to analyse school-to-work transition patterns in Germany. In particular, I concentrate on the labour market entrance of individuals with completed apprenticeship training, and ask whether or not apprenticeship training makes a difference for their post-apprenticeship labour market entrance.

Proponents of the German apprenticeship system point out that the early attachment of the trainee to the world of work provides a two-fold benefit. First, in a world of match-specific uncertainty, the experience of the apprentice and the certification of skills increase information and thereby reduce search unemployment at early stages in their career. Second, the accumulation of firm-specific human capital leads to stable long-term employment relationships.

The empirical evidence does not support this one-sided positive view, however. I find that post-apprenticeship transition patterns in Germany are more complex than is commonly believed. Before entering into (frequently short-term) full-time employment, 26% of the apprentices undertake further vocational training, mandatory military service, become unemployed or drop out of the labour force. 36% of the initial full-time employment spells are terminated within short periods of time with a transition to further training, military service, unemployment or non-participation.

Further, I find evidence of high post-apprenticeship unemployment incidence at the beginning of one's career. 19% of those completing an apprenticeship experience an immediate unemployment spell and 8% have a first employment spell that terminates in unemployment. Still, apprenticeship compares favourably with university or other post-secondary full-time school training which exhibit even higher rates of post-training unemployment incidence.

Studying the employment history of individuals who enter employment allows for an assessment of the empirical content of standard human capital arguments of firm-financed training. Firms are willing to pay for the training as long as it is firm specific, and thus of no value to outside firms, it is argued. Once the investment has taken place, both firms and trainees have an interest in maintaining the match. If this is a valid argument, however, there should be

evidence for a) high retention rates, and b) lower job stability for job movers compared with those staying in the training firm.

Using monthly calendar observations I find that the average immediate retention rate is 56%. After five years, an estimated 61.7% of those staying initially with their training firm have left. For those directly moving to a new employer, the first job tends to have a somewhat longer duration, with 59.8% ending within the five-year period. I draw two conclusions: a) the long-term retention rate of trainees is low; and b) there is no evidence that firm-specific capital accumulated during the apprenticeship increases the stability of the successive employment match.

Also, in contradiction to human capital considerations, the proportion of match dissolution is (at least initially) lower for university graduates than for former apprentices. The overall conclusion is that apprenticeship training is a less secure road to stable employment than often assumed.

1. Introduction

In this study I use data on individual schooling and employment histories drawn from the German Socio-Economic Panel (GSOEP) to analyze school-to-work transition patterns in Germany. In particular, I concentrate on the labor market entrance of individuals with completed *apprenticeship training*. This allows for an evaluation of some recent theoretical arguments on the effects of such company based training on individual skills and fortunes.

Although there is still some disagreement as to the economic rationale underlying the apparent success of the German apprenticeship system in providing vocational training to the young, elements of an emerging consensus are given in Soskice (1994). Related recent studies are Franz and Soskice (1994), Steedman (1993), Lynch (1994) and Harhoff and Kane (1994). The main features of the German apprenticeship system are that it a) is company based, b) has no firm participation mandate, and c) leads to a nationwide recognized skill certificate. Soskice (1994) argues that the apprenticeship is part of an institutional framework that creates an incentive structure able to resolve the standard market failure problems involved in training marketable skills. Part of this structure is a co-existence of high-quality and low-quality apprenticeships. The former are typical for large firms in industry and commerce, providing eventually access to well functioning internal labor markets that offer high employment security. Firms use the training period for screening prospective employees and workers get an additional insurance policy in form of a nationally recognized skill certificate for the (rare) case of job displacement. Low quality apprenticeships prevail in the *Handwerk* (crafts) sector where the programs provide employment at a sub-minimum wage for those who would otherwise have difficulties in finding employment.

The particular feature of apprenticeship training is an early attachment of the trainee to the world of work. How profitable is the match specific experience for both companies and trainees? If the apprentice had accumulated substantial amounts of firm

specific knowledge, one would expect to see high retention rates upon termination of the apprenticeship contract. Further, the average tenure after the switch to regular employment status should exceed the average tenure of those who either switched employer or entered the labor market directly from a full time school or university. This holds true in particular in a world where a heterogeneous match quality cannot be observed *ex-ante* (i.e. where jobs are an experience good). By the same token, the incidence of unemployment upon labor market entrance can be expected to be lower for apprentices than for school-leavers. Soskice (1994) summarizes this view by stating that the apprenticeship "(...) provides secure employment prospects, typically with long tenure and a range of additional benefits" (p.53).

In this study I provide empirical evidence that casts doubt on a one-sided positive assessment of the effects of apprenticeship training on the labor market performance. In particular, I show that apprenticeship training is frequently *not* the beginning of a stable long-term employment relationship and that its role for the school-to-work transition is ambiguous. Using observations on roughly 500 apprentices from the GSOEP I focus on the following five performance measures:

1. *Observed Transition Patterns*

The post-apprenticeship transition patterns in Germany are more complex than is commonly believed. Before entering into a (frequently short term) full-time employment, 26 percent of the apprentices undertake further vocational training, mandatory military service, become unemployed or drop out of the labor force. 36 percent of the initial full-time employment spells are terminated within short periods of time with a transition to further training, military service, unemployment or non-participation. Consistently, Buechtemann et al. (1993) report that 5 years after completion of secondary education only 53.6 percent are in full-time employment. This proportion is low in international comparison and compares to e.g. 71.2 percent in the U.S.

2. *Unemployment Risk*

The German labor market is notorious for its low youth unemployment rate. Recent comparative figures based on individual data from the GSOEP for Germany and the Panel Study for Income Dynamics for the U.S., respectively, indicate that five years after leaving secondary education, 1.9 percent of a cohort are unemployed in Germany, compared to 8.2 percent in the U.S. (Buechtemann et al. (1993)). How much of this difference can be explained structurally (*e.g.* by the existence of the apprenticeship system)? And how much is just an artefact due to the longer post secondary schooling tracks in Germany that keep young individuals out of the labor market? I provide evidence for a much higher unemployment incidence at the beginning of one's career by looking directly at the transition of apprentices (and other post-secondary school leavers). 19 percent experience an immediate unemployment spell and 8 percent have a first employment spell that terminates in unemployment. These figures are even higher for individuals who leave university or other post secondary full-time schools.

3. Retention Rates

Buechtemann (1989), based on firm data for 1985, documents high post apprenticeship retention rates of apprentices in training companies. The retention rates vary between 56 percent in firms with 5-9 employees to 87 percent in companies with 1000 or more employees. These figures are, however, quite misleading since they relate to the instantaneous transition. Harhoff and Kane (1994) show that the average retention rate falls to 36 percent if a 5 year period is considered.

The mirror image of firms retention rates are the whereabouts of former apprentices. Based on the GSOEP data I find the following flows: 26.1 percent leave the training firm heading for non-employment. Of the 73.9 percent entering regular employment following an apprenticeship, 75.8 percent stay with their training firm. The average immediate retention rate is thus 56.0 percent. However, only an estimated 38.3 percent of stayers remain with the training firm for 5 years or longer. To obtain a lower bound for the long-term retention rate we may relate this proportion back to the original 100 percent. The ratio of apprentices staying with their training company for 5 years or

longer drops to a mere 21.5 percent. This number understates the true retention rate, however, since it assumes that those who left the training firm once do not return later.

4. *Duration of first job*

Using monthly calendar observations I find that an estimated 19.1 (62.5) percent of the first jobs following an apprenticeship end within one (five) year(s). The hazard is first increasing and then decreasing in tenure. The hazard is (initially) lower for university graduates, and slightly higher for those entering the labor market with other schooling degrees. Further, there is evidence that the hazard of leaving a job is higher for those apprentices who did not stay with their training company.

5. *Post-apprenticeship earnings*

Couch (1993) and Winkelmann (1994) use the GSOEP to study the effect of apprenticeship training on subsequent earnings. These studies use random samples of employed individuals in conjunction with information on their training history. While previous apprenticeship training increases earnings, there are no extra-normal returns, in the sense that the net present value of the flow of incremental earnings does not exceed the net present value of the initial investment cost (foregone earnings).

In the following sections I will elaborate upon the empirical evidence, as well as interpret it in the light of available theoretical arguments. Section 2 starts with a detailed description of the schooling and training institutions in Germany. Section 3 presents the data selection and discusses various aspects of the transition to the labor market. Section 4 reports on regression results. Section 5 concludes.

2. The German Educational System

The German educational system rests on three pillars: General schooling, vocational training and university education. General schooling (that follows 4 years of primary

school) is offered through 3 school types: *Hauptschule* ends after a total of 9 years of schooling with or without a formal degree; *Realschule* leads to a formal degree after 10 years; *Gymnasium* yields the *Abitur* (Baccalaureat) after 13 years. In general, the track for general schooling is determined after primary school (around the age of 10), although formally, schools may be switched afterwards. Table 2.1 displays the distribution of schooling levels for the German population as well as for the class leaving school in 1990.

Table 2.1: Education Levels in Germany

	Total Population	Leaving School in 1990
Secondary School (9 yrs.)	61.6	24.6
Secondary School (10 yrs.)	19.3	35.0
High-School (12 or 13 yrs.)	14.7	33.8
No formal degree and other	4.4	2.6

Source: *Datenreport* 1992.

Table 2.1 reflects the shift towards more general schooling that has taken place in the last decade(s). In 1990, 33.8 % acquired a level of education that is comparable to the high-school degree in the U.S. while for the population as a whole, only 14.7 % have an equivalent degree.

After graduating from one of the three schools, there are three basic choices:¹ To enter the labor market without further training, to pursue a vocational training or to enroll in a technical college or university. As can be seen from Table 2.2, the percentage of the labor force without formal degree beyond the general school system is relatively low with 16 % (in 1991). Thus, a major fraction of the labor force has pursued either vocational or college training.

¹A large fraction of the male population has to undergo a mandatory army training of currently 12 months (15 months before 1991), usually sometime during the age of 18 to 21.

Vocational training in Germany is often equated with the apprenticeship system. This is an oversimplification since there in fact are various institutions providing vocational training. In terms of participation rates, however, the factual predominance of the apprenticeship programs becomes evident: looking at the vocational training of the labor force in 1991 it turns out that 72% had participated in an apprenticeship (see Table 2.2). Other institutions providing vocational training are specialized vocational schools that exist for a variety of professions (health care, civil servants, hotel employees), and preparatory vocational schools (*Berufsvorbereitungsjahr/Berufsgrundbildungsjahr*). While the apprenticeship and specialized vocational schools lead to a professional degree, enrollment in preparatory vocational schools does not, and it is usually succeeded by further vocational training leading to a professional degree. Finally, there are post vocational programs for individuals that have already accumulated some work experience. Examples are the qualification of a master craftsman, which requires additional formal training (usually through evening courses). Master degrees also exist in the industrial sector. In 1990, the number of awarded master degrees amounted to 104,654 (*Statistisches Jahrbuch* 1992, p. 419).

Table 2.2: Training of the Labor Force 1991

Apprenticeship (Dual System)	72
Specialized Vocational School	16
Technical College	4
University	8
No formal degree	16

(in %; multiple degrees); Source: *Berufsbildungsbericht* 1993, p. 129.

The German university system involves two types of institutions: universities proper and technical colleges (*Fachhochschule*). Technical colleges have a somewhat shorter curriculum (4 as compared to an average of 5 to 6 years) and they offer study courses mainly for engineers, but also in the fields of economics, social studies, agriculture

and design. While entering an university requires the *Abitur*, technical colleges can be entered with "*Fachabitur*" which is awarded either after 12 years of *Gymnasium* or after finishing *Realschule* plus additional vocational training. Both vocational and university trainings lead to a professional degree ("*Berufsqualifizierender Abschluss*").

The distinctive feature of the apprenticeship system is that it involves training both at the workplace as well as in a vocational school. For this reason, it is also referred to as the "dual system". The apprenticeship system is organized (in a cooperation of state institutions, employer organizations and unions) by training areas, the most important of which are "Industry and Trade", "Crafts", "Public Service", and "Professionals". Table 2.3 lists the number of apprentices as well as the number of new contracts and participation rates in each area.

Table 2.3: Apprentices by Training Area (1991)¹

	IT	CR	PS	PR	Rest	All
(1) # of apprentices	734.3	460.4	137.4	61.8	36.3	1,430.2
(2) new contracts	278.4	170.0	21.9	53.9	15.5	539.7
(4) Participation rate ² (in %)	7.3	13.5	3.0	2.8		

Sources: *Berufsbildungsbericht* 1993. *Statistisches Jahrbuch* 1992.

Notes: Numbers are in thousands.

¹ IT: Industry and Trade; CR: Crafts; PS: Public Service; PR: Professionals (physicians, lawyers, and architects).

² Participation rate is the number of employees (net of apprentices) divided by the number of apprentices (1).

For every apprenticeship program, a detailed curriculum is developed, and adapted over time to changing requirements. The co-ordination and administration of the programs lies in the hands of the (regionally organized) chambers of commerce, chambers of crafts and similar organizations for the other areas. Firm participation is voluntary. Firms are entitled to participate in the program, i.e. to offer training places, if they are able to provide an adequate environment for training.

The market for apprenticeship contracts works essentially the same as the job market for any other job. Matches are generally realized through formal application and interview although a number of contracts is brokered through the Federal Employment Agency. The contracts run for 2 to 3 years, depending on the program and the previous general schooling. However, there are also apprenticeship programs lasting for 3 1/2 years. The apprentice spends 3 to 4 days a week at the work site, where he/she is trained on the job. 1 or 2 days a week, the apprentice visits a state financed vocational school. For some occupations, a period of unique training on the job is followed by a 6 week period of vocational school training only. How much of the presence at the workplace is associated with training and how much with productive work is an open question. The different programs vary considerably in their training requirements and while an apprentice in the crafts (say a chimney sweep) will from early on do the same work as a normal employee, many programs in the industrial sector maintain a high training component throughout the apprenticeship. This view is supported by the high participation rate in the crafts sector reported in Tables 2.3. Firms' net training costs in this sector are low and the apprenticeship programs essentially allow for an employment at sub-minimum wages (Heckman, 1993).

Apprentices' wages are paid by firms, unlike other systems that use a payroll tax to a fund or direct funding through the government. The earnings during an apprenticeship vary considerably with the occupation. The average gross earnings increased from 602 DM in 1984 to 750 DM in 1990. Earnings after the apprenticeship are between three and four times higher. In general, apprenticeship earnings are not taxed. However, mandatory social security contributions (i.e. health insurance, unemployment insurance and pension plan contributions) have to be paid (18.4% of gross earnings in 1991). A curious feature of the unemployment insurance system is that individuals that become unemployed following an apprenticeship immediately qualify for UI benefits of 68% (with children) or 63% (no children) of the net wage of a typical worker in the trained occupation. Thus, an apprentice may experience a considerable increase in

take home money once he/she files for unemployment.

Apprenticeship programs exist for 380 professions (in 1991). This number decreased by 37% from 606 in 1971, reflecting an effort to establish broader skill profiles. There is a high concentration of apprentices in a few occupations. 38.4 % of the male, and 54.7 % of the female apprentices concentrate in 10 occupations. The most frequent occupations for males are (% of all male apprentices in parentheses) car mechanic (7.6), electrician (5.2) and industrial mechanic (3.6). The most frequent occupations for females are physician aide (7.6), qualified retail saleswoman (6.8) and hairdresser (6.8).

Table 2.4: General Schooling of Apprentices 1991 (in %)

No formal degree	2.6
Secondary School (9 yrs.)	35.8
Secondary School (10 yrs.)	32.2
High-School (12 or 13 yrs.)	14.6
Other*	14.8

Source: *Berufsbildungsbericht* 1993. * Other includes preparatory vocational schools (Beruf-sgrundbildungsjahr, Berufsfachschule, and Berufsvorbereitungsjahr.)

The fraction of apprentices with high-school degree, and thus with formal college access, has steadily increased over the last decade reaching 14.6% in 1991. They concentrate in a few occupations. Most notably, 15.8% of the apprentices with a high-school degree engage in a banking apprenticeship, and they constitute 58.2 % of all the apprentices in banks (*Berufsbildungsbericht* 1993, p. 157). Other occupations with a large fraction of high-school graduates are qualified insurance clerks, marketing assistants and booksellers. Often, high-school graduates do pursue further university training after finishing an apprenticeship. In a survey of the 1992 graduating cohort, 20% opted for an apprenticeship. Within this group, 39% planned to enroll in an university after the apprenticeship. 41% were undecided and only 20% planned to immediately enter the

labor market. (See *Berufsbildungsbericht* 1993, pp. 60/61).

3. Apprenticeship Data in the GSOEP

The data used in this study are from the first seven waves (1984-1990) of the German Socio-Economic Panel (GSOEP). The first wave covers around 6000 households and 12000 individuals. I use the GSOEP Public Usage File (See Wagner et al. (1993) for details). The GSOEP is a general household survey and is not specially designed for the analysis of the labor market entrance of the young. However, it includes a detailed (monthly) calendar that allows to study employment transitions and durations. Young individuals are included in rough proportion to their share of the total population. There are two main drawbacks of using the GSOEP for the analysis of labor market transitions of a particular, narrowly defined, sub-population. The first is a relatively small sample size - my final apprenticeship sample includes 482 observations. The second is the shortness of the observed time period. Although observation periods of up to seven years are possible, most individuals are observed for much shorter periods of time. For instance, the duration of the first job is right censored for 274 out of 482 observations. A further general disadvantage of the GSOEP are problems with the wage data which are collected not monthly but rather at points in time arbitrarily determined by the interview date. Finally, the GSOEP does not include information on the distinction between apprenticeships in the *Handwerk* sector and those in industry and commerce.

Still, the GSOEP gives a rich set of labor related variables, as well as detailed employment histories. While there are limitations, there is still much to be learned from the GSOEP. In particular, focusing on durations provides much more information than just considering transitions (and is more important for assessing the predictions of various theories on the effect of training). To my knowledge, the monthly employment histories of the GSOEP have not been previously exploited for the analysis of the post-training

labor market entrance.

The subsample of labor market entrants I generate includes those individuals who switch from training to full-time employment in one of the observed years. I use the following annual filter question:

Since the beginning of the previous year have you finished school, vocational training, or university?

If the question is answered positively, the respondent is asked to specify the type of training. I define three states of origin: *School* is either a general school or a (full-time) vocational school; *University* is either university proper or technical college; and *Apprenticeship*, which is a subset of vocational training. Table 3.1 gives the case numbers.

Table 3.1. Case Numbers

	<i>Apprenticeship</i>	<i>University</i>	<i>School</i>	
<i>Gross cases</i>	640	188	1367	2185
<i>./.</i> not latest degree	38	9	237	
	602	179	1130	1911
<i>./.</i> no training spell, no info. on post-training spell, sample interruptions	76	45	534	
	526	134	596	1256
<i>./.</i> no info. on full-time empl.	42	27	331	
<i>Net Cases</i>	482	108	165	757

The initial sample contains 2185 observations on individuals completing one or multiple training programs. Selecting the most recent degree, the sample reduces to 1911. 59 percent are school leavers, 31 percent finish apprenticeship and 9 percent university. In a next step, I use monthly calendar data to establish transition histories for these individuals. The monthly calendar distinguishes the following 9 states:

- 1 Full-time employment
- 2 Part-time or occasionally employed
- 3 Vocational training (in firm)
- 4 Registered unemployed
- 5 Retired
- 6 In school/college
- 7 Military service
- 8 Out of laborforce (Housewife/man)
- 9 Other

Further, I merge the spell information with a separate question on job changes. Thus, I can distinguish employment spells with a first employer, second employer, and so forth. Observations on individuals that do not report any training spell (3 or 6), no post-training spell, and/or have missing years were deleted. The resulting case number falls to 1256. For these individuals I observe spell sequences giving information on the post-training transition (not necessarily to employment). An example for a very simple sequence would be 3 from January 1983 to July 1984 (left censored) and 1 from August 1984 to December 1989 (right censored). Most sequences are much more complex. The largest sequence found in the data consists of 20 spells. Table 3.2 displays the type of the first post-training spell by state of origin.

Table 3.2. Whereabouts after training

	Apprenticeship	University	School
Full-time employment	358 (0.681)	62 (0.463)	145 (0.243)
Part-time or occasionally employed	17 (0.032)	18 (0.134)	32 (0.054)
Vocational training (in firm)	0	5 (0.037)	286 (0.479)
Registered unemployed	101 (0.192)	18 (0.134)	61 (0.102)
In school/college	15 (0.029)	0	0
Military service	17 (0.032)	2 (0.015)	19 (0.032)
Out of laborforce	12 (0.023)	26 (0.194)	29 (0.049)
Other	6 (0.011)	3 (0.022)	24 (0.040)
N	526	134	596

There are large differences by state of origin in both post-training employment and post-training unemployment incidence. While more than 2 out of 3 individuals enter full-time employment after finishing an apprenticeship, this ratio drops to less than 1 out of 2 for university and 1 out of 4 for school leavers. Interestingly, while part-time employment is of minor significance for apprenticeship and school, almost 1 out of 7 university leavers records a part-time spell. Adding up full-time and part-time employment, the employment gap between apprenticeship and university drops to 12 percent.

The numbers for school-leavers have to be interpreted with some care. First, school includes both secondary and post-secondary (vocational) schools. Thus, the fact that 25 percent enter full-time employment is not in contradiction to a much lower direct transition rate from secondary school. Second, the data cannot identify direct school-to-school transitions since they are recorded as a single spell. Thus, the transition ratios are conditional on leaving the school state. Thereby, some important features of the transition complexities are lost. For instance, Helberger et al. (1994) report that of those individuals starting an apprenticeship in 1983, 33 percent had completed a school

related "waiting loop", i.e. passed a "basic training year" (*Berufsgrundbildungsjahr*) or a preparatory vocational school. These individuals are part of the 47.9 percent that eventually are recorded as entering an apprenticeship.

Next, I turn to the unemployment numbers and concentrate on apprenticeship and university. A remarkable 19 percent of those leaving an apprenticeship become subsequently unemployed. This figure is much higher than numbers reported elsewhere (Blien et al. (1990) give a ratio of 8 percent for 1985). The main explanation for the discrepancy is that I use a finer grid provided by the monthly calendar observations as opposed to measuring unemployment on a yearly basis or at arbitrary interview dates.

With a reported 13 percent, the incidence of unemployment appears to be lower for university graduates. This is, however, a wrong conclusion since it ignores some ambiguities in the unemployment question. This question asks whether the respondent has been *registered* as unemployed during a given month. Usually, individuals will report to the local unemployment authority (*Arbeitsamt*) only if he/she is eligible for unemployment benefits which, in turn, depends on whether or not the individual has been previously employed (and thus paid into the unemployment insurance fund). While apprentices pay U.I. contributions and thus are eligible for U.I. benefits, this is in general not true for university students. Thus, a more accurate comparison has to add up the unemployment and the 'out of labor force' responses which accounts for the "hidden unemployment" of university graduates. By this broader unemployment measure, university graduates perform "worse" than apprentices with around 1 out of 3 individuals out of work following the university as compared to 1 out of 5 for apprentices. How much of this unemployment is "voluntary" and just reflects taking some time off is left to anecdotal evidence.

I note in passing that search explanations of unemployment would predict a smoother transition of former apprentices with their early attachment to the labor force as compared to individuals following other, non firm-based schooling tracks, a prediction that

is consistent with the findings in the data. If one defines a 'smooth' transition as an *immediate* transition to employment, apprenticeship performs better than university. Moreover, university transitions are to a much higher degree to part-time employment, which might reflect in part under-employment and constitute a bridge to final full-time employment.

In a next step, I want to focus on the employment transitions of apprentices. Excluding observations without information on a first full-time employment gives a final apprenticeship sample of size 482. Table 3.3 shows the distribution of the graduation dates over time. Since the calendar information is given for the previous year, 1983 is the first year in my sample and 1989 the last.

Table 3.3. End of Apprenticeship

Year	1983	1984	1985	1986	1987	1988	1989	1983-1989
N	19	56	65	79	96	89	78	482

I distinguish two types of transitions to full-time employment. The first is an immediate transition without intervening non-employment spell. Immediate transitions can take two forms: 270 individuals enter an employment contract with their training firm. This give an instantaneous retention rate of 270 out of 482, or 56.0 percent; 86 are employed at another company. The remaining 126 individuals experience a delayed transition with an intermediate non-employment spell which ultimately, and within the observation period, turns into full-time employment. Table 3.4 shows that the main source for delayed transitions is unemployment, followed by (mandatory) military service.

How, and when, does the first employment end? The first part of the question is answered by a look at the distribution of destination states. It turns out that 95 employment spells (or 45 percent of the uncensored spells) end with a move to a new employer and 38 with a transition to unemployment. For 273 individuals, the first employment spell did not finish within the observation period.

Table 3.4. Employment transitions of apprentices

	(1)	(2)
Full time employment	Same Employer	270
	New employer	86
Unemployed	90	38
School/college	7	17
Military service	17	20
Out of labor force	6	20
Other	6	19
Censored		273
	482	482

(1) Post-apprenticeship transition

(2) End of first employment spell

Next, I analyze the *durations* of first employment. Among other things, knowledge of employment durations is necessary to calculate intermediate and long-term retention rates of apprentices. How much of post-apprenticeship employment is long-term (corresponding to the notion that apprenticeships lead into stable, possibly lifelong, employment), and how much is short-term and transitory? Table 3.5. displays the product limit estimator for the survivor rates from 3 months up to 5 years. The survivor rate at point t gives the percentage of individuals whose first-employment spell lasted at least for a period t (measured, for instance, in months). The survivor rates are displayed separately for those entering employment from apprenticeship, from university, and from school, respectively. For instance, I find that 9.4 percent of all post-apprenticeship, 4.9 percent of all post-university, and 10.6 percent of all post-school employment spells are terminated within 3 months. Over time, the survivor rates for the three training types converge, with rates dropping to between 38 and 35 percent after five years: independently of state of origin, almost 2 out of 3 first employment spells are ended within five years; conversely, more than 1 out of 3 first employment

spells have a duration of five years or longer.

**Table 3.5. Duration of first employment spell:
Survivor rates (product limit estimator)**

Months	3	6	12	30	60
<i>Apprenticeship (N=482)</i>					
All	0.906	0.827	0.709	0.529	0.375
Stayers (N=270)	0.922	0.856	0.735	0.546	0.383
Direct movers (N=86)	0.964	0.893	0.788	0.578	0.402
Unemployed (N=90)	0.797	0.657	0.513	0.383	0.356
<i>University (N=108)</i>	0.951	0.920	0.885	0.638	0.353
<i>School (N=165)</i>	0.894	0.749	0.632	0.460	0.351

During the five year period, the survivor rates are higher for university graduates, and lower for school-leavers, apprentices providing the intermediate case. Within the sample of apprentices, the survival rates are higher for those who directly change employer after an apprenticeship and lower for those with an unemployment spell as compared to the survival rates of individuals staying with the training firm. These empirical patterns cast some doubt on two hypotheses put forward as explanations for the effectiveness of apprenticeship training:

a) Firm specific human capital

If apprenticeship training leads to an accumulation of firm specific human capital those individuals staying with their training firm should display a greater attachment (and thus higher survivor rates) than those individuals whose human capital is rendered obsolete through a change of employer. This is not reflected in the data. Also, if it is firms which invest into firm specific human capital, firms would loose on their investment in many instances (provided that the employment duration falls short of the period of amortization).

b) Jobs as experience goods

According to this view, it is only possible to 'experience' (rather than to inspect *ex-ante*)

a job match in order to reduce the match specific uncertainty and to find out whether or not the match is good, *i.e.* mutually beneficial. Since apprentices learn about the firm during their training, and firms can use the time to screen apprentices, the match specific uncertainty has been greatly reduced upon termination of the training, and the surviving matches should be more stable than new ones. Again, the data do not support this hypothesis.

The previous discussion uses a two dimensional classification of survival rates by transition type. This procedure ignores potentially important further sources of sample heterogeneity. In the next section, I will use more formal techniques of multiple regression analysis to further explore the determinants of post-apprenticeship transitions to employment.

4. Determinants of Transition-Patterns

This section discusses some regression results on the determinants of a) the probability of an intervening spell of unemployment and b) the duration of the first employment spell. To this end, I control for various individual specific covariates listed in Table 4.1. Due to missing variables the sample size further reduces to now 431 observations.

The summary statistics in Table 4.1. reveal that post-apprenticeship earnings are on average more than twice as high as apprenticeship earnings. Most of the apprentices in the sample (44 percent) have received a *Hauptschule* degree followed by *Realschule* (38 percent). 8 percent have *Abitur* and thus formal access to universities. Most of the apprenticeships take place in small firms; 15 percent are in large firms with over 2000 employees. Females are slightly underrepresented. The average age upon termination of an apprenticeship is 20. Age is an increasing function of previous education: individuals with *Hauptschule* and *Realschule* are on average 20, while individuals with *Abitur* are 23 years old. The foreigner share of almost 20 percent deserves two comments. First,

the GSOEP oversamples the populations of foreigners with specific countries of origin - those with active "Guestworker" recruitment taking place in the pre-1973 period. Second, the "foreigners" in this apprentice sample are almost exclusively children of Guestworkers and born in Germany, *i.e.* second generation (Germany has no right-of-birth citizenship).

Looking at the sample means by school degrees, I find that better educated apprentices earn a wage premium and are placed in larger firms. Interestingly, the main jump occurs when moving from *Hauptschule* to *Realschule*, whereas the difference between *Realschule*, restricted *Abitur*, and *Abitur* is not as marked. For instance, the *Realschule* degree means 11 percent higher apprenticeship earnings and 7 percent higher post-apprenticeship earnings than *Hauptschule*, whereas the further earnings increase for *Abitur* is only 3 and 2 percent, respectively. Apprentices with *Realschule* are to a lesser extent foreigners (5.5 compared to 29.7 percent), male (41.3 compared to 67.2 percent) and trained in small firms with less than 20 employees (32.7 compared to 44.9 percent). Also, *Realschule* graduates are less likely to become unemployed after an apprenticeship (14.2 compared to 20.6 percent). The difference between *Hauptschule* and *Realschule* cannot be explained solely by the additional year the latter takes, but rather by the fact that both schools are physically separated after grade 4, with the better teachers and students ending up in *Realschule*.

Next, I return to the initial question: What determines post-apprenticeship transition patterns? I start with an analysis of the incidence of unemployment. The simple cross-tabulations in Table 4.1. reveal that unemployed individuals have an overproportional share of *Hauptschule* graduates, small firm apprentices, and foreigners. Is it admissible to conclude that *Hauptschule* graduates are more likely to become unemployed? It depends on whom we want to use as reference individual. To compare the *Hauptschule* graduate with an *otherwise identical* individual, we have to account for the sample correlation between school degree and the other covariates making use of multiple regression techniques. Table 4.2 (first column) shows the results of a Probit regression

for the determinants of post-apprenticeship unemployment.

The overall significance test rejects the full specification against a restricted model without covariates. Also, no single individual coefficient is significantly different from zero. In other words, neither schooling, nor firm size or nationality provides a *specific explanation* of individual variations in unemployment experience. Within the population of apprentices, there is no identifiable subgroup with significantly lower or higher unemployment risk.

The next column of Table 4.2. gives the regression results of an estimated *Weibull* model with length of first employment spell as dependent variable. The model is parameterized so that positive regression coefficients shift the conditional exit probability, or *hazard rate*, proportionally upwards, and thus reduce the survivor rate. Schooling variable as well as demographic variables have no effect on the duration of first employment. I find, however, a strong negative effect of firm size. Individuals who had a large training company (more than 2000 employees) have a significantly lower risk of leaving employment than individuals trained in a smaller firm. This effect is strongest for individuals staying in their training firm, providing support for the internal market hypothesis. However, the negative effect is found even for individuals who do not stay with their training company. This might lend support to the idea that firm size also measures the quality of the apprenticeship: large firms are confined to the industrial and commercial sectors (as opposed to *Handwerk*) that in turn provide better employment prospects. However, another important measure of training quality, the wage during the apprenticeship, has no significant effect on employment durations.

Further, the type of post-apprenticeship transition has no effect on employment duration. Direct movers have a negative coefficient, *i.e.* a lower risk, but the coefficient is not significantly different from zero. This finding corresponds to the conclusions based on the univariate product limit estimators in the previous section. It confirms the evidence suggesting that individuals staying with their training firm are not better off

in terms of employment tenure, as would be predicted by human capital and screening models of training.

5. Conclusions

The main feature of the German apprenticeship is that it is founded on a voluntary training contract between training firm and apprentice. Thus, in contrast to full-time school based training, apprentices obtain their training in close contact to the world of work. Does this imply that completed apprenticeship training greatly facilitates labor market entry by reducing uncertainty and the need for search? Is there any evidence (and if yes, to what extent) for accumulation of firm specific human capital and screening behaviour that might explain firms' willingness to participate in apprenticeship programs?

I find that, in comparison to university or full-time school graduates, the transition of apprentices to employment is more direct and faster. Still, 19 percent experience an unemployment spell before entering employment. The first job of an apprentice tends to be less long than the first job of an university graduate (and longer than the first job of direct entrants from school). The main factor for a lasting employment relation is firm size. Trainees from large firms have significantly higher expected tenure than others. Surprisingly, it does not matter whether apprentices switch employer or not. Job changes are frequently observed and contribute to a low retention rate of apprentices that drops below 1 out of 3 after 5 years. Both points suggest a subordinate role of firm specific training during an apprenticeship.

Tables

Table 4.1: GSOEP Apprentices Data: Sample means¹

	all	school1	school2	school3	school4	unemployed
wage1	6.514	6.454	6.566	6.517	6.595	6.482
wage2	7.615	7.574	7.642	7.615	7.666	7.568
school1	0.438					0.541
school2	0.375					0.319
school3	0.037					0.013
school4	0.081					0.069
size1	0.380	0.449	0.327	0.375	0.314	0.444
size2	0.315	0.312	0.321	0.437	0.257	0.236
size3	0.150	0.105	0.191	0.062	0.200	0.152
size4	0.153	0.132	0.160	0.125	0.228	0.166
German	0.805	0.703	0.925	0.937	0.942	0.763
single	0.851	0.851	0.888	0.812	0.857	0.805
male	0.552	0.672	0.413	0.500	0.485	0.527
age	20.32	19.71	20.17	22.50	22.77	20.07
length	18.37	17.97	18.37	24.50	16.45	14.06
direct	0.190	0.195	0.160	0.187	0.228	
unemployed	0.167	0.206	0.142	0.062	0.142	
N	431	189	162	16	35	72

Variables:

wage1: gross monthly income (in logarithms) during last year of apprenticeship.

wage2: gross monthly income (in logarithms) during first year of employment.

school1: Hauptschule degree (9 years of schooling)

school2: Realschule degree (10 years of schooling)

school3: restricted Abitur (12 years of schooling)

school4: limited Abitur (13 years of schooling)

size1: firm size of training firm: less than 20 employees

size2: 20-200 employees

size3: 201-2000 employees

size4: more than 2000 employees

age: age in the year of transition

length: Duration of first employment spell (or survivor time for censored observations)

direct: immediate transition to new employer.

Table 4.2: Post-Apprenticeship Transitions

	Unemployment ¹	Empl. Duration ²
constant	-0.127 (1.557)	-2.795 (1.774)
lwage	-0.061 (0.247)	0.060 (0.269)
school2	-0.216 (0.172)	0.010 (0.208)
school3	-0.709 (0.527)	-0.219 (0.449)
school4	-0.229 (0.294)	0.194 (0.337)
size2	-0.246 (0.185)	-0.172 (0.214)
size3	-0.046 (0.228)	-0.178 (0.265)
size4	0.013 (0.226)	-1.452** (0.434)
size4 × stayer		-1.534** (0.571)
German	-0.059 (0.191)	0.238 (0.243)
Single	-0.173 (0.201)	-0.020 (0.238)
male	-0.101 (0.159)	0.103 (0.183)
direct mover		-0.140 (0.233)
unemployed		0.089 (0.256)
α		0.904* (0.056)
log-likelihood	-190.31	-803.69
N	431	431

Notes: Standard errors in parentheses. Coefficients significantly different from 0 (1 for α) are marked with * (90 percent confidence level), or ** (95 percent confidence level);

¹Probit model; dependent variable is unemployed(1)/employed(0) immediately following the apprenticeship.

²Weibull model; dependent variable is length of first employment for uncensored, and survivor time for censored observations.

References

- Berufsbildungsbericht 1993** Der Bundesminister für Bildung und Wissenschaft (ed.), Bonn.
- Blien, U., H. Reinberg, and M. Tessaring 1990** Die Ermittlung der Übergänge zwischen Bildung und Beschäftigung, *MittAB* H.1, 181-204.
- Buechtemann, C.F., J. Schupp and D. Soloff 1993** Roads to work: school-to-work transition patterns in Germany and the United States, *Industrial Relations Journal* 24:2, 97-111.
- Buechtemann, C.F. 1989** *Befristete Arbeitsverträge nach dem Beschäftigungsförderungsgesetz*, Forschungsvorhaben im Auftrag des Bundesministerium für Arbeit und Soziales.
- Couch, K. A. 1993** High School Vocational Education, Apprenticeship, and Earnings: A Comparison of Germany and the United States, Paper presented at the 1993 GSOEP User Meeting, Berlin.
- Datenreport 1992** Zahlen und Fakten über die Bundesrepublik Deutschland, Statistisches Bundesamt (ed.)
- Franz, W. and D. Soskice 1994** The German Apprenticeship System, mimeo, Konstanz.
- Harhoff, D. and T.J. Kane 1994** Financing Apprenticeship Training: Evidence from Germany, mimeo.
- Heckman, J. 1993** Assessing Clinton's program on job training, workfare, and education in the workplace. *NBER Working Paper* No. 4428.
- Helberger, C., U. Rendtel and J. Schwarze 1994** Labour market entry of young people analysed by a double threshold model, in: J. Schwarze, F. Buttler, G.G Wagner (eds.) *Labour market dynamics in present day Germany*, Frankfurt and Boulder: Campus/Westview.
- Institut der Deutschen Wirtschaft 1993** (ed.) *Zahlen zur wirtschaftlichen Entwicklung der Bundesrepublik Deutschland*, Köln: Deutscher Instituts Verlag.

- Lynch, L. 1994 Payoffs to alternative strategies at work, in: R.B. Freeman (ed.), *Working under Different Rules*, New York: Russell Sage Foundation for NBER.
- Soskice, D. 1994 Reconciling markets and institutions: The German Apprenticeship System, in: L. Lynch (ed.) *Training and the private sector: International comparisons*. Chicago: University of Chicago Press for NBER.
- Statistisches Jahrbuch 1992 Statistisches Bundesamt (ed.), Wiesbaden: Kohlhammer.
- Steedman, H. 1993 The economics of youth training in Germany, *Economic Journal* 103, 1279-1291.
- Wagner, G.G., R.V. Burkhauser, and F. Behringer 1993 The English Language Public Use File of the German Socio-Economic Panel, *Journal of Human Resources* 28, 429-433.
- Winkelmann, R. 1994 Training, Earnings, and Mobility in Germany, *CEPR Discussion Paper* No.982.