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Is Occupational Mobility in Germany Hampered by the Dual Vocational System? The Results of a British-German Comparison

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Abstract

We compare occupational mobility in Germany and Britain and focus on the effects of the German dual vocational system. Based on a comparison of mobility rates for different occupations within each country and between the two countries, we find that mobility is particularly low in German apprenticeship occupations and conclude that the dual system impedes occupational changes. However, German mobility rates are also lower in non-apprenticeship occupations, and only a small part of the overall low mobility rate in Germany (almost three times lower than in Britain) can be attributed to the apprenticeship system. We conclude that institutions such as employment protection are more important for explaining cross-country differences in mobility. Moreover we find evidence for the claim that occupational mismatching at the beginning of working lives is more widespread in Britain.

JEL Classification: J62; J24

1. Introduction

It is well-known that there are pronounced cross-country differences in occupational mobility. In Britain, the percentage of workers who change occupations each year is almost three times higher than the corresponding percentage for Germany.[1] To some extent, this finding may stem from a lower need for mobility in Germany due to better person-occupation matches at the beginning of workers' careers. However, in modern economies, a certain degree of mobility is deemed necessary because it allows for adjustments of the occupational structure to technological change and shifts in the demand for goods and ser-

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[1] See Longhi / Brynin 2010 and the results presented below.

vices. From this point of view, low mobility appears as a considerable drawback.

One of the main suspects for low occupational mobility is the dual vocational system. In Germany, more than 60 percent of young people undergo vocational training in the dual vocational system, which combines education at a vocational school with workplace-based training in a firm[2]. The skills and theory taught and the certificates issued for each occupation are strictly regulated and defined by national standards.

The German dual system is also known for ensuring a relatively smooth transition from school to work, which is why youth unemployment is relatively low. On the other hand, the system has been blamed for sorting young people too early into rigidly defined occupations, thereby hampering occupational mobility later in life (cf. OECD, 2004). According to Schneider / Zimmermann (2010), it is possible that "a too severe and rigid differentiation of the occupational profiles makes adjusting to technological and structural change more difficult later on and obstructs the necessity to acquire new skills and change jobs" (p.12, see also Hanushek / Woessmann / Zhang, 2011).

In this paper, we examine whether the dual system truly impedes occupational mobility. To our knowledge, this question has not yet been investigated systematically. Toward this end, we compare the mobility of employees in different occupations in two countries with differing vocational systems: Germany and Britain. As British workers acquire occupational skills mostly on the job and without formal training, the relevance of formal certificates and the link between the vocational training system and the occupational system is much weaker[3].

Seeking to identify the influence of the vocational system, we exploit the fact that not all jobs and occupations in Germany require dual training. There are two more categories of jobs: those that demand academic education (professions such as law or medicine) and those that do not require any formal education at all (unskilled labour). In a multivariate setting, we analyse the differences in occupational mobility between these three categories of German occupations. Then, we repeat the procedure for Britain classifying British occupations according to the three German categories and compare the results for the two countries. We employ this exercise based on the assumption that if the dual system truly impedes mobility in Germany, then mobility should be particularly low in occupations that mainly involve dual training relative to other occupations in Germany. However, mobility among British individuals whose occupations require dual training in Germany should *not be* lower than that of British

[2] Similar systems also exist in Austria, Switzerland and Denmark.

[3] For a detailed comparison of the vocational training system in both countries, see Scherer (2005).

individuals in other occupations – or at least, the extent of the differences between the three categories of occupations should be much smaller in Britain than it is in Germany. If the latter is not the case, then we can conclude that the low mobility associated with German apprenticeship occupations cannot be attributed to the dual system but rather stems from other characteristics that are also valid for Britain: for instance, the inherent nature of the tasks performed in these occupations. In essence, these tasks may require more occupation-specific human capital than do the tasks associated with other occupations, which in turn may hamper occupational mobility. In such a scenario, it would not matter whether this human capital is acquired through dual vocational training or by other means (e.g., learning by doing).

In addition to shedding light on the role of the dual vocational system, our analysis also yields insight into the importance of academic education and labour market experience for occupational mobility in the two countries in question.

2. Institutional Determinants of Occupational Mobility

Human capital theory and (on-the-job) search and matching theory provide a useful framework for analyzing the determinants of occupational mobility. Here it must suffice to briefly recall the main points[4]. An important driver of mobility is a bad worker-occupation match caused for example by imperfect information or other market frictions. Moreover initially good matches may turn into bad ones due to changing preferences of workers and / or changes in the task content of specific occupations. Also occupation-specific demand shocks may force workers to leave their occupation. At the same time mobility depends on the availability of jobs in other occupations (this is why it is largely pro-cyclical) and is limited by entry barriers, by uncertainty because of imperfect information about other occupations, and by the costs of mobility. A large part of these costs is associated with the loss of occupation-specific human capital acquired during vocational training and while working. As human capital is accumulated over time, this is also why mobility usually declines with occupational tenure and is costly not only for workers but for employers as well, who have to built up human capital again with a new worker.

The comparative framework also allows us to analyse the effects of labour market institutions on mobility. The main relevant institutions in this context are: the vocational education system and its link to the labour market, the system of employment protection, and income protection in the case of unemployment. The vocational education system may produce disincentives for mobility

[4] For a more detailed discussion of the determinants of occupational mobility, see, e.g., Moscarini / Vella (2008), Longhi / Brynin (2010), Kambourov / Manowskii (2008).

by focusing (too) much on specific skills that can only be used in a particular occupation; another disincentive might be the requirement to earn a specific certificate to enter a new profession, which creates an entry barrier to this occupation. The system of employment protection comes into play because in most cases, an occupational change also involves a firm change, i.e. a new contract with a different employer. Usually employment protection for new contracts is (close to) zero and increases with tenure. So firm changers have to give up protection rights. This should matter more if the protection level for existing contracts is high. Finally, if unemployment compensation is relatively generous, it exerts less pressure to accept job offers that require a change in occupation.

How do Germany and Britain compare with regard to these institutions and policies? The German dual vocational system is well-known for its high level of vocational specificity; there are currently more than 340 apprenticeship occupations (in German, *Ausbildungsberufe*). An apprenticeship usually lasts between two and three years. The workplace-based portion of the training is thought to ensure that the apprentices become familiar with the requirements of their future occupation, and firms may also use the workplace training period as a screening period. Because the dual training which German individuals receive is highly standardised for each occupation, credentials or certificates play an essential role, because they provide direct, relevant information about the vocational skills that graduates have accrued through the training. However, as previously mentioned, only approximately 60 per cent of all German employees are employed in apprenticeship occupations; the remainder work either in professions that usually require higher education or in low-skilled occupations requiring not more than lower secondary education.

In Britain, education after secondary (compulsory) school is largely provided by the state and takes place in colleges and vocational schools. These programs focus on generating general skills rather than occupation- and workplace-specific skills. The latter are mainly provided afterwards through learning on the job or additional firm-provided training. Thus, vocational training is not highly occupation specific, but also credentials play a minor role, as the job-related portion of training is only weakly standardised,. Generally speaking, the link between the educational system and the employment system is relatively weak: graduates only attain limited knowledge of what will be demanded of them in a particular workplace and employers have only limited knowledge of the skills and abilities of graduates.

With respect to the other institutional features mentioned above, the level of employment protection is clearly higher in Germany than in Britain, especially for standard work contracts which still comprise the majority of contracts. Moreover, the German system of unemployment compensation is more generous than the British one, even after several reforms in Germany that lowered

the level of income support and made it more difficult for recipients to reject job offers which also require a change of occupation.

From these theoretical considerations and the institutional differences between the two countries, we derive the following hypotheses:

1. The *relative* mobility in occupations requiring dual training should be lower in Germany than in the same occupations in Britain. Relative mobility refers to the degree of mobility in these occupations compared to other occupations in the same country.
2. Due to the higher employment and income protection the level of mobility should be in general lower in Germany, also in occupations requiring no specific training or requiring higher education. However, it is beyond the scope of this paper to identify the specific influence of one of these two institutions, as the main focus is whether and to what extent the dual system in particular contributes to lower mobility in Germany.
3. In Britain, work experience and age should matter more for mobility than in Germany. The British system may favour occupational mismatching at the beginning of working lives, leading to frequent "job hopping" in the first years after the graduate's entry into the labour market. To the contrary, in Germany, mobility should be low already in the beginning of a person's working career, because the dual training leads to relatively good initial worker-occupation matches.

3. Data and Descriptive Evidence

Our analysis is based on the 1993 to 2008 waves of the British Household Panel Survey (BHPS) for Britain and the 1994 to 2009 waves of the German Socio-Economic Panel (SOEP) (see Wagner et al., 2007) for Germany. In both datasets, the occupations of working respondents are double-coded using both national classification systems and the 1988 International Standard Classification of Occupations (ISCO-88). Here we use the internationally comparable three-digit codes from the ISCO and confine our analysis to individuals who are between 26 and 65 years old, regularly work at least 10 hours in either dependent employment or self-employment and are assigned valid ISCO codes.[5]

Because we cannot identify the German apprenticeship occupations directly, we use the SOEP respondents' answers to the question regarding what type of education or training is necessary for their work[6]. Within the pooled SOEP

[5] Soldiers are excluded from the analysis. The minimum age of 26 is chosen because at this age, most individuals have completed their education. However, using a lower age threshold (e.g., 20 years) does not substantially change our results.

sample, 54% of the respondents state that vocational (dual) training is required for their work, while 21% declare that higher education (general university training or university training in the applied sciences) is required and 25% state that no specific level of education (or only brief introductory training) is necessary. We define a given occupation as an "apprenticeship occupation" if more than two thirds of the respondents working in this occupation reported that their work requires vocational training. "Higher education occupations" and "low education occupations" are coded accordingly. We then impose the German categories on the British sample: if a given ISCO occupation is identified as an apprenticeship occupation in Germany, then it is also classified as such in the BHPS sample. Of course, this categorisation is purely theoretical, because dual apprenticeship occupations do not exist in Britain and because a given apprenticeship occupation in Germany may require a higher education level than it does in Britain. By employing this procedure, we are able to separate the impact of the different requirements for individual occupations from the impact of the nature of the tasks performed in those occupations, which we assume to be similar in both countries.

Occupational mobility, which may or may not be accompanied by a change of employer, is defined as a change in a worker's occupation between two consecutive years. Such changes can be identified based on changes in the ISCO codes associated with particular individuals. To exclude spurious mobility that has been artificially generated by classification errors, we count an ISCO code change as indicating mobility only if the respondent explicitly states that his/her job is different from the occupation that s/he held during the previous year. Note that in our definition of occupational mobility, we do not include changes in occupation that occur after a period of non-employment that lasts longer than a year because in such cases it is impossible to distinguish actual mobility from spurious mobility.

Table 1 contains descriptive evidence for the two samples. The mean values for age, sex and marital status are similar in the two countries. Among the German respondents, an intermediate level of education (ISCED codes 3 or 4) is more common than in Britain. Note that the ISCED code indicates the education level *attained*, which is not necessarily identical to the education level *required* by a person's job, as defined by our three categories of occupations. We classify a given occupation as "apprenticeship occupation" if at least two thirds

[6] The German apprenticeship occupations are listed in the register of officially recognized apprenticeship occupations (*Liste der staatlich anerkannten Ausbildungsberufe*) produced by the Federal Institute for Vocational Training and Education (BIBB). However, we cannot employ this register because it is not consistent with the ISCO code. In examining the occupations that we define as apprenticeship occupations, we can confirm that overall, the official apprenticeship occupations have been identified correctly. Furthermore, our chosen method can also be used with occupations that require university education and those that require no-training, for which no official list exists.

of workers in this occupation report that apprenticeship is required for their job and apply the same rule for the two other categories. In the overall sample of German participants 51% work in apprenticeship occupations, 13% in occupations that require higher education and 8% in low-education occupations. These percentages total approximately 72%. The remaining observations (28%) are distributed across occupations with no clear prevalence of a specific level or type of education. The BHPS observations are clustered to a similar degree as in Germany within the category of low-education occupations and to a lesser degree within the higher-education and apprenticeship occupations; the total is approximately 60%.

Table 1

Descriptive statistics of the samples drawn from the BHPS and the SOEP

	Germany	U.K.		Germany	U.K.
Share of men	0.59	0.54	Higher education occ.	0.13	0.10
Age	43	43	Apprenticeship occ.	0.51	0.39
Share of married	0.65	0.69	Low education occ.	0.08	0.09
ISCED 0-2	0.12	0.18	Other occupations	0.28	0.42
ISCED 3-4	0.56	0.41			
ISCED 5-6	0.31	0.41			
N outward	110067	79897			
N inward	110095	79914			

Note: Weighted mean values of the variables from the SOEP and BHPS sample used in the estimations of the outward mobility. Data Source: SOEP waves 1994 – 2009, BHPS waves 1993 – 2008.

Table 2 displays the yearly gross mobility rates for the two samples, i.e., the job changers as a percentage of all persons observed as having worked during two consecutive years within the observation period (first line). This rate is almost three times as high in Britain (9.81%) as in Germany (3.46%). The next three lines provide a breakdown of the outward mobility rates by occupational category. For the purpose of comparison, we also calculated the proportions of individuals who moved into the three types of occupations, as presented in the last three lines.

Of the German individuals who were observed to have worked in apprenticeship occupations in one year, 3.1% changed occupation in the following year. Note that we refer to all changes to other ISCO occupations rather than exclusively to changes to other apprenticeship occupations. The occupations with the lowest mobility rates (both outward and inward) in both countries are those that demand higher education in Germany. The result for Germany contradicts the common assumption that apprenticeship occupations hamper mobility

most. The highest mobility rates can be observed in low-education occupations – a result that is consistent with our expectations. Workers do not lose large quantities of specific knowledge when leaving these occupations and also these occupations are not restricted to individuals who meet particular educational or training qualifications.

Table 2

Yearly mobility rates for different occupations, classified according to education required

Share of occupation changers	Germany	Britain	Britain / Germany
… on all working persons	3.46%	9.81%	2.8
… out of apprenticeship occ.	3.1%	9.0%	2.9
… out of higher education occ.	2.7%	7.4%	2.7
… out of low education occ.	3.9%	11.4%	2.9
… into apprenticeship occ.	2.8%	8.9%	3.2
… into higher education occ.	2.6%	7.5%	2.9
… into low education occ.	4.1%	10.0%	2.4

Notes: The numbers show e.g. the share of workers that leave an occupation that has been classified as an apprenticeship occupation by at least 2/3 of the respondents. Data Source: SOEP waves 1994–2009, BHPS waves 1993–2008.

In Britain, fewer job changers move out of occupations that require higher education, compared to the other two occupational categories, but the rate at which this occurs is 2.7 times the German rate. The level of movement out of low-education and apprenticeship occupations is also comparatively high at 2.9 times the figure for Germany. In addition, in Britain, many more people move into occupations that would require an apprenticeship in Germany. As expected, this difference reflects the restricted access to these occupations in Germany.

4. Estimation Strategy and Results

A further step to disentangle the effects of different factors on the occupational mobility rate in Germany and Britain is to use multivariate models. In the following section, we concentrate on outward mobility (out of a specific occupation to any other occupation with another ISCO code). With the dependent variable being dichotomous (move out of an occupation or not), we use an unbalanced random effects panel probit model.

The probability that individuals will change occupations depends on several individual characteristics and on the type of occupation that the person is vacating. This probability is modelled as follows:

$$\Pr(y_{it} = 1 | x_{it}, \beta, \varepsilon_i) = \Phi(\beta' x_{it} + \varepsilon_{it}), \text{with } \varepsilon_{it} = v_{it} + u_i,$$
$$Var(\varepsilon_{it}) = \sigma_v^2 + \sigma_u^2 = 1 + \sigma_u^2 \quad \text{and}$$
$$Corr(\varepsilon_{it}, \varepsilon_{is}) = p = \frac{\sigma_u^2}{1 + \sigma_u^2},$$

where x_{it} is a set of individual characteristics such as age (as a proxy for labour market experience) and its square, sex, and marriage and includes additional dummy variables for (German) apprenticeship occupations and higher-education and low-education occupations. We also include year dummies to account for the effects of the business cycle. ε_{it} is the disturbance term, which is comprised of two normally distributed parts with zero means: the standard disturbance term v_{it} and the individual specific disturbance term u_i. Because there is no closed-form solution, Gauss-Hermite quadrature is used to approximate the total log-likelihood[7].

We run the regression separately for both countries to examine whether the differences between the apprenticeship occupations and the non-apprenticeship occupations (controlling for the distinction between high- and low-education occupations) are due to the nature of the occupations or the occupational system. Wald-Tests show that the parameters of each model are jointly significant at the 1 % level.

We use the occupation indicators for the German system with both datasets and estimate the model. *Table* 3 reports the average marginal effects of the dummy variables for apprenticeship and higher-education occupations and that of the age variable on outward mobility in Britain and Germany. To make the effects for Britain and Germany easily comparable, we also compute the average marginal effects as a percentage of the mean mobility rates in the two countries.

The outward mobility rates are significantly lower for apprenticeship occupations than for non-apprenticeship occupations in Germany and for high-education occupations than for low-education occupations in both countries. The apprenticeship indicator is also negative in Britain, but not statistically significant[8]. This finding indicates that these two types of occupations generate exit barriers[9]: for example, they require that individuals attain specific human capi-

[7] The results are stable with regard to the number of quadrature points.

[8] The marginal effects of Germany and Britain are statistically different only regarding the age and the higher education indicator while the difference between the apprenticeship indicators of both countries is not significant.

Table 3

Probability to move – Average marginal effects

	Outward mobility	
	Germany	**Britain**
Low education occ.	Reference category	
Apprenticeship occ.		
AME	–0.019	–0.012
	(0.004)	*(0.007)*
AME perc.	–54.9%	–12.2%
Higher education occ.		
AME	–0.017	–0.029
	(0.002)	*(0.006)*
AME perc.	–49.1%	–29.6%
Age		
AME	–0.001	–0.004
	(0.00007)	*(0.00002)*
AME perc.	–2.9%	–4.1%
Observations	110,067	79,897
Wald Chi squared (34)	1087.56	1355.32

Note: AME = Average marginal effect, AME perc.= Average marginal effect as a percentage of the mean of the mobility rate. Apprenticeship occ.= occupations with more than 2/3 of the respondents stating that they need a dual system apprenticeship, higher education occ. accordingly with university degrees. LR-Test rejects $H_0 : p = 0$ at the 1% level in all specifications.
Other explanatory variables: Dummies for apprenticeship, higher and low education occupations 1/3 –2/3 (and 2/3–1 in the last case), dummies for two Isced groups, married, sex, time dummies. Full results are available from the authors upon request.

Standard errors in parentheses. Data Source: SOEP waves 1994–2009, BHPS waves 1993–2008.

tal or certificates that then hinder them from moving out of these occupations. In Britain, the occupations that require apprenticeships in Germany hinder outward mobility much less than they do in Germany (–55% in Germany versus –12% in Britain). This finding is consistent with the expectation that movement out of apprenticeship occupations is hampered by the German certification system. Nevertheless a partial effect of approximately 20% of the German effect can also be observed in Britain. Thus, the low level of occupational mobility associated with apprenticeship occupations in Germany is only partly a function of the system; we suspect that the portion of low mobility which is also visible in Britain is due to the nature of the occupations, which makes changing occupations costly or unattractive (e.g., because of the high level of specific knowledge required in handicraft occupations). The age effect is negative and, at 2.9%, is (significantly) smaller in Germany than it is in Britain at

[9] The difference between the influence of high education occupations versus apprenticeship occupations is only significantly different in Germany.

4.1%. Thus, we can confirm that the less regulated British education system leads to a steeper decrease in the probability of career changes. Adjustment processes occur mainly in the beginning of graduates' careers in Britain and the accumulation of firm-specific occupational human capital makes changes increasingly difficult over time.

5. Conclusions

The main goal of our paper was to investigate whether and to what extent the dual vocational system contributes to low occupational mobility in Germany. The analysis was performed by comparing outward mobility rates of three categories of occupations typical for the German vocational system (apprenticeship, higher and low education occupations) and by comparing the differences in these category-specific mobility rates across Germany and Britain (i.e. difference-in-differences strategy). Our results suggest that indeed the German dual system hampers occupational mobility, as workers in German apprenticeship occupations are indeed the least mobile occupational group in Germany – but not in Britain. Moreover, we find that in Germany age and work experience exerts less influence on mobility, which supports the hypothesis that occupational mismatching at the beginning of working lives is less frequent than in Britain. However, given the low mobility rates of employees also in higher and in low education occupations (compared to Britain), we conclude that only a small part of the overall low mobility in Germany can be attributed to the apprenticeship system.

Moreover, the low mobility both in apprenticeship *and* in higher education occupations, compared to low education occupations in Germany, points to the relevance of certificates in both types of occupations, which seem to matter much more than the dual training. However, our results provide no "hard evidence" for this hypothesis and further research is needed to clarify this point. A similar caveat also applies with regard to the influence of institutions like employment protection or income support for the unemployed. As our results indicate that the dual system is not the main cause for low mobility in Germany, it is plausible to assume that these institutions matter much more for cross-country differences than the vocational system. Yet, a more profound investigation of institutional effects is beyond the scope of this paper and has to be left to future research.

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