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Effects of Job Entry Restrictions on Economic Integration - Evidence for Recent Ethnic German Immigrants

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Jan Brenner*

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Abstract

We analyze the impact of job entry restrictions on the economic integration of recent ethnic German immigrants, using twelve waves of the German Socio-Economic Panel. The German labor market closely ties job accessibility to vocational education which likely hampers the transferability of foreign human capital. To assess this effect, we compare the job mismatch probabilities of ethnic German immigrants and German natives and the employment probability in jobs that vary by the qualifications they require. Our results suggest that ethnic Germans are disadvantaged upon arrival, yet almost completely assimilate to comparable natives considering these two job quality measures. Furthermore, controlling for these factors explains a considerable share of the earnings gap between ethnic and native Germans.

JEL Classification: F22, J61, J62

Keywords: Human capital transferability and investment, job mismatch, skill requirements, immigrants, wage assimilation

August 2007

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1 Introduction

The landmark study of Chiswick (1978) on the transferability of human capital to the destination country's labor market triggered a sizable empirical literature investigating the wage assimilation of immigrants towards the labor income of comparable natives.¹ An important aspect of the economic success of immigrants, which to our knowledge has not yet been well investigated, should be the job allocation mechanism on the host country's labor market. In this study we try to shed some light on this issue by analyzing the impact of job entry restrictions on the economic integration of ethnic German immigrants who entered Germany after the fall of the iron curtain.

A characteristic feature of the German labor market is its very rigid allocation of workers to jobs. Particular work certificates or occupational licenses are typically required to exercise a large number of occupations, often they are even a legal prerequisite. These degrees are mainly obtained in the so called dual system of apprenticeship, a form of vocational training in which participants are educated half of the time in a company, the other half in specific vocational schools run by the government. Depending on the type of education - approximately 300 vocations are distinguished - and the schooling degree of the apprentice the vocational training lasts between 2 and 3.5 years. Since the vocational programs are very specific, degrees obtained are not easily transferred to other occupations.²

As a consequence of these institutional features of the German labor market, required qualifications of a job should play a major role in explaining observed wage differences across workers. This consideration is formalized in the job competition theory (Thurow, 1975) which even assumes that required skills determine wages completely. Any additional human capital possessed by employees thus generates no additional return. This approach is fundamentally different from the more prominent human capital theory (Becker, 1975), postulating that labor income is mainly determined by the acquired skills of the employee. These are assumed to be perfectly known to firms and rewarded at their marginal product. Sattinger (1993) discusses assignment models that take into account demand and supply side factors to explain the allocation mechanism on labor markets, thereby bringing together these two polar cases. These models further motivate the question of the importance of the match between required and acquired skills in determining wages. The empirical literature evaluating the impact of job mismatches - the incidence of workers having higher or lower education than demanded by their

¹For a survey of the German evidence see Bauer, Dietz, Zimmermann, and Zwintz (2005).

²See Müller, Steinmann, and Ell (1998) for a more detailed description of the German educational system and its importance for labor market entry.

employer - on earnings differentials was started by Duncan and Hoffman (1981).

Largely drawing on the theory of the transferability of human capital (Chiswick, 1978), we develop hypotheses why immigrants should be particularly prone to job mismatches upon arrival and why we should observe an assimilation to natives' lower mismatch probabilities with years of residence. Closely related to this issue, we further argue that immigrants should be more likely to begin their work career on the host labor market in jobs requiring lower skills than jobs comparable natives occupy. Yet, we expect them to access similar job positions as natives after an adjustment period. The capability of immigrants to enter employment positions according to their vocational skills should be decisive for a successful economic integration in host societies whose labor markets are characterized by strong ties between vocational skills and job accessibility, just as it is the case in Germany. Only if immigrants eventually are employed according to their degrees, their wages will assimilate to the levels of comparable natives, given that required qualifications are as decisive for the returns to education as is assumed by job competition theory as well as assignment models.

The group of immigrants under study, ethnic Germans who entered Germany after the fall of the iron curtain, is of interest for at least two reasons. One is the sheer number that arrived since the late eighties. According to Zimmermann (1999), about 800,000 immigrants of German ethnicity entered the country in 1989 and 1990 alone. The second interesting fact is their German ancestry due to which they enjoy a special legal status compared to other immigrants.³ Most importantly, upon arrival in the country they are granted German citizenship. Secondly, they are eligible to attend free language classes and specific vocational courses. Thirdly, the German government entitles ethnic German immigrants to apply for an official recognition of their educational certificates (Kreyenfeld and Konietzka, 2001). This policy was implemented to upgrade the value of these degrees obtained in the non-market economies of Eastern Europe and the Soviet Union on the German labor market and is of particular interest to this study.

In our empirical application, utilizing twelve waves from the *German Socio-Economic Panel* (GSOEP), we test the hypotheses outlined above. We compare the job mismatch probabilities and the propensity of natives and ethnic Germans who immigrated since 1988 to be employed in jobs requiring varying levels of education. In the second step of the analysis, we assess the impact of controlling for these factors on the wage assimilation profile of ethnic German immigrants in a

³For a brief overview of the history of ethnic German migrants see among others Schmidt (1996) or Zimmermann (1999).

Mincer-type wage regression framework.

The remainder of this paper is structured as follows. In the following section we outline the main ideas and implications of human capital transferability and investment. We continue by developing hypotheses about the relevance of labor market conditions on the integration process of immigrants, and briefly review the evidence about the immigration experience of ethnic Germans. **Section 3** details the empirical strategy comprising the data description and the econometric models. Our results are presented in **Section 4**. In **Section 5** we draw some conclusions.

2 Theory and Evidence

2.1 Human Capital: Transferability and Investment

The seminal paper of Chiswick (1978) develops a theory on the transferability of immigrants' human capital acquired in their home country to the labor market of the destination society. He further derives implications for human capital investments after arrival and how the labor income of immigrants relative to natives should evolve with time of residence. This study started a rich empirical literature on the wage assimilation of immigrants. Further important contributors to the theoretical literature, among others, are Borjas (1985), pointing out the importance of the difference between immigrant cohorts, as well as Duleep and Regets (1997b, 1999) who develop a formal model of human capital investment highlighting the effects of imperfect human capital transferability. In what follows we briefly outline the major arguments of the transferability of human capital and then, in some more detail describe the contribution of this study to the literature.

The starting point of Chiswick (1978) is the observation that immigrants are typically disadvantaged on the destination countries' labor market vis-à-vis natives upon arrival since they lack several marketable characteristics that generate monetary returns. Among these are what is often referred to as country-specific human capital comprising language skills and knowledge about customs in the host society. Furthermore, the education they possess might not meet the host society's standards or might be simply outdated if the immigrant originates in a technologically less developed country. Another factor hampering immigrant's labor market prospects might be the lack of knowledge of the domestic labor market's functioning and optimal job search methods. Finally, in many cases it might be very difficult and costly for a company to evaluate the quality of foreign educational certificates, reducing the chance for the immigrants to exploit acquired

skills efficiently on the labor market. On labor markets such as in Germany this might have severe consequences on their earnings potential.

All the points stated so far, drawing mostly on Chiswick (1978), imply that upon arrival immigrants are faced with a labor market disadvantage that should manifest itself in lower earnings (and a higher unemployment probability) compared to similarly trained natives. Qualitatively, the bigger the differences between home and destination country in terms of development and technology as well as culture and language, the lower should be the transferability of human capital and hence the lower the wage upon arrival. On the other hand, the lower the valuation of immigrants' skills, the lower are as well the opportunity costs to devote time to investment in further education (Duleep and Regets, 1997a). They further argue that another incentive for immigrants to invest in education is the complementarity of skills acquired in the home country to additional human capital obtained after arrival.⁴ These skills should subsequently increase immigrants' income by a higher rate than the income of natives over the same stages of the life cycle, hence a catch-up should be attainable.

Since the earlier in life an investment is made, the longer the investor can benefit from it, one should expect a steep assimilation profile in the first years after arrival that flattens out with years of residence in the host country. Furthermore, those individuals suffering the most from imperfect transferability of their skills upon arrival should experience the fastest catch-up process since their incentives for additional human capital investments are strongest. Depending on the assumptions about the distribution of unobservable characteristics, for instance cognitive ability and motivation, and how they vary between immigrants and natives, full assimilation of immigrants to the native wage levels might or might not be achieved.⁵ The catch-up might further be hampered by systematic discrimination against immigrants through employers.⁶

The empirical evidence evaluating human capital transferability and invest-

⁴If, for instance, skills initially cannot be applied due to insufficient knowledge of the domestic language, improving communication skills is obviously complementary to this education as it will eventually enable the immigrant to work in the profession trained for. Furthermore, if the qualification acquired in the home country is outdated and therefore not rewarded on the host labor market, this knowledge should still be useful in acquiring the relevant skills to work in the original profession, though utilizing the more modern technology prevalent in the destination country.

⁵For various theories about skill differences between immigrants and natives as well as empirical evidence see among others Borjas (1987), Chiswick (1978), Duleep and Regets (1997b), and Dustmann (1993).

⁶Economic models of discrimination are surveyed by Altonji and Blank (1999).

ment in general focuses on verifying the following hypotheses: do immigrants suffer from an initial income disadvantage and, more importantly, do they catch up to comparable natives with years of residency? This is typically investigated in a human-capital-earnings framework augmented with an immigrant indicator and a quadratic term of *years since migration* which should capture the initial wage differential and the assimilation process, respectively. However, more direct evidence on human capital investment of immigrants after arrival in a domestic country is rather scarce. It therefore remains unclear what really is responsible for observed wage assimilation profiles. Do immigrants really invest in additional job-specific human capital such as on-the-job training, acquire language skills, start a new vocation from scratch, or find more adequate jobs as we will discuss below?

2.2 Job Mismatch and Skill Requirements

The empirical literature on job mismatches mainly focuses on overeducation referring to the case that a worker is higher educated than the job demands and its impact on wages.⁷ In this study, however, we are more concerned with a different form of job mismatch. In particular, we analyze the probability of being employed in an occupation not trained for.⁸ We develop several hypotheses why immigrants should be particularly prone to such an employment situation upon arrival and why their propensity to find an appropriate job should increase and probably assimilate to the level of natives. Most of this reasoning is straightforwardly implied by the theory on human capital transferability discussed above. A second outcome measure we analyze is the actual formal education required for the job currently employed at. In a second step, we assess the impacts of both these measures on wages.

Due to the imperfect transferability of their human capital, immigrants face a disadvantage vis-à-vis natives whose skills are fully applicable. Secondly, immigrants have an incentive to invest in further human capital. In the meantime, it is likely that they accept any temporal job, presumably unskilled and/or part-time, that is offered to them to maintain themselves and their family but not necessarily one they were originally trained for. Additionally, if foreign degrees, at least initially, are not recognized by employers, this should result in a relatively high probability of a mismatch.⁹ Lacking information about how to optimally search

⁷See e.g. Hartog (2000) or Groot and Maassen van den Brink (2000) for an overview. Bauer (2002) provides evidence for Germany.

⁸For a discussion of the determinants of such job mismatches and evidence for 13 European countries we would like to refer to Wolbers (2002).

⁹Since ethnic German immigrants can apply for an official recognition of the degrees ob-

a job most likely also hampers the probability of finding an appropriate job. The same arguments would imply that recent immigrants should on average work in occupations that require less skills than the jobs filled by natives that are similarly endowed with skills demanded on the labor market.

With years of residence, these disadvantages should gradually be reduced, resulting in an assimilation to native mismatch rates. Considering the skill requirements of jobs, a catch up of immigrants towards the native average should also be expected. Furthermore, if employers initially offer only low-skilled jobs to immigrants due to the difficulties of evaluating their educational certificates, they might be convinced by their work performance, subsequently accept the foreign degrees, and adjust the job position and payment accordingly.¹⁰

Since immigrants acquired their skills according to the demands of their home labor market, this might result in a higher likelihood of suffering from structural mismatches (Kreyenfeld and Konietzka, 2001), i.e. they most likely have a higher probability than natives to possess skills not demanded on the host country's labor market. In consequence, the 'natural' mismatch rate of immigrants should exceed that of natives. An institutional reason for immigrants underachieving the proportion of matching jobs compared to natives in welfare states like Germany might be the limited access to unemployment benefits. Whereas natives might turn down a non-matching job offer since they are financially supported by generous welfare payments, immigrants are less likely to be able to afford such a behavior.¹¹

Finally, if skill requirements and job mismatches depend on immigration status as well as years of residency and in turn have an effect on wages, then omitting them from a wage regression should be partially reflected in the immigrants' assimilation profile. Considering our definition of a mismatch and the hypothesis of (at least initially) higher mismatch probabilities for immigrants, the initial wage disadvantage should be over- and the speed of assimilation be underestimated.

tained in their home countries this point might be less relevant for them if companies accept the governmental judgments concerning the quality of the acquired education.

¹⁰This situation can be interpreted in the framework of statistical discrimination. Firms want to hire and pay efficient wages according to the productivity offered to them by workers. However, they cannot directly observe productivity but have to rely on signals such as educational certificates and work experience. The lower valuation of immigrants' compared to natives' skill signals inclines employers to offer lower wages to immigrants. Over time, firms collect more information about the true productivity of their employees. This reduces the weight placed on the initial signals when forming expectations about their true productivity. If migrants are as productive as natives the wage gap should therefore gradually disappear.

¹¹In the present analysis, however, this effect is irrelevant since ethnic Germans are German citizens and therefore have full access to welfare benefits.

The same is concluded considering job requirements.

2.3 Empirical Evidence for Ethnic German Immigrants

We commence this overview with evidence on wage assimilation of ethnic German immigrants who entered Germany after the collapse of the Eastern Bloc. A very recent study by Fertig and Schurer (2007) utilizes 21 waves of the *German Socio Economic Panel* (GSOEP) covering the period from 1984 to 2004. They follow the standard modeling approach in the literature and estimate wage profiles by the inclusion of an immigrant dummy and a quadratic years of residence term. Due to different specifications and estimation approaches, the authors predict full assimilation of ethnic Germans who entered since 1988 to occur after between 9 and 12 years. The initial earnings differential of ethnic German immigrants is estimated to be in the vicinity of 50 to 60 %.

In an earlier contribution, using two cross-sections from the *ALLBUS*, Schmidt (1997) concludes that there are only negligible differences in the labor market performance of immigrants of German ethnicity and German natives. The analyzed data, however, stems from the years 1982 and 1990, hence mainly investigates immigrants who entered Germany before the soviet system collapsed. Interestingly, the only slight indication of an earnings disadvantage is found for the most recently arrived group of ethnic Germans who entered between 1986-1990, comprising some of the first immigrants analyzed in this study.

Using the first wave of the foreigner sample of the GSOEP, Bauer and Zimmermann (1997) compare the economic performance of ethnic German immigrants with immigrants from former East Germany (GDR) that entered between 1984 and 1994. They report no initial earnings differential between the two groups but find the wage incomes of ethnic immigrants to grow faster with years of residence from which they draw the conclusion that east Germans invest less in human capital after arrival. Bauer and Zimmermann (1997) further find evidence that those immigrants who had social networks in Germany before arrival earn significantly more than those who had no support of friends or family.

Finally, the paper by Kreyenfeld and Konietzka (2001) is the study which is most closely related to the aspects raised in this paper in investigating the transferability of educational credentials of ethnic German immigrants and foreigners to the German labor market, utilizing GSOEP data from 1998. First, they find that vocational and university degrees of both immigrant groups have no predictive power for the employment probability whereas both these variables exhibit strong

positive impacts for natives. Estimating a wage regression, their results further suggest that only those individuals who work in a job trained for receive significant premiums on their education, whereas these premiums are considerably higher for natives than for immigrants of German ethnicity. They conclude that entering the professions they are trained for is the crucial threshold for immigrants to be successful on the German labor market, however acknowledge that the observed shares of migrants managing to do so are relatively low vis-à-vis German natives.

3 Empirical Strategy

3.1 Data

In our empirical application we utilize twelve waves of the *German Socio-Economic Panel* (GSOEP), covering the years 1994-2005.¹² Our sample comprises male German natives who were born in Germany and have the German citizenship since birth and male ethnic Germans who entered Germany in 1988 or later. One of the advantages of analyzing this particular group of immigrants is the fact that theoretically one could observe them in the GSOEP right after they arrive. However, since the foreigner sample of the GSOEP was collected for the first time in 1994, all those immigrants who entered before that date are only identifiable after some of the interesting human capital and labor market adjustments already occurred. As a consequence, we end up with only 72 immigrant-year observations for the first five years since arrival in Germany. We therefore abstain from modeling the assimilation profiles in the standard parametric way¹³, yet divide immigrants into three categories: being in the country (i) for at most five years, (ii) for six to ten years, and (iii) for more than ten years. Summary statistics of immigrants are presented in this manner as well. Furthermore, we restrict our main sample to employed respondents in the age range of 18 to 60.

Table A1 reports summary statistics of the dependent variables of the analysis. The wage information consists of monthly real gross labor income (in terms of Euros in 2000). The job mismatch indicator is one if a respondent is employed in

¹²The data used in this paper were extracted using the Add-On package PanelWhiz v1.0 (Oct 2006) for Stata. PanelWhiz was written by Dr. John P. Haiken-DeNew (john@panelwhiz.eu). The following authors supplied PanelWhiz SOEP Plugins used to ensure longitudinal consistency, John P. Haiken-DeNew (15), Markus Hahn and John P. Haiken-DeNew (31). The PanelWhiz generated DO file to retrieve the SOEP data used here and any Panelwhiz Plugins are available upon request. Any data or computational errors in this paper are my own. Haiken-DeNew and Hahn (2006) describes PanelWhiz in detail.

¹³See as well the subsequent subsection.

a profession not trained for¹⁴ and zero otherwise. For both these variables, huge initial discrepancies between natives and immigrants are observable that diminish with time of residence, yet are far from being eliminated after 13 years, the average duration of residence in the country of the last group. Finally, we report employment by qualification requirements. A cursory glance reveals that ethnic German immigrants are more frequently employed in jobs requiring firm-specific training such as *Job Introduction*, *On-the-Job Training*, and *Courses*¹⁵ (as well as *No Training* at all) than natives. Nevertheless, these shares approach native levels after more than ten years. Turning to *Vocational Training* this picture is flipped upside down with immigrants now assimilating from a lower level towards the observed frequency of natives and even overshooting it slightly. Considering jobs requiring academic degrees, a very substantial gap between natives and ethnic Germans exists and appears to persist over the observed horizon of years of residence.

Table A2 documents the explanatory variables with *Under 16* referring to the share of ethnic German immigrants who entered Germany at compulsory school age.¹⁶ Natives have on average a slight advantage in basically all labor market characteristics (*Years of Schooling*, *Work Hours*, *Part-time* employment, and *Job Tenure*).¹⁷ Furthermore, ethnic German immigrants are on average younger, more frequently married, and live in larger households with more children than natives.

3.2 Econometric Models

To analyze the hypotheses outlined in **Section 2.2**, we specify three different econometric models. To evaluate the employment conditions of immigrants in comparison to natives, we analyze the qualification requirements (Q) of the current job as well as the incidence of a job mismatch (M). Due to the categorical nature of these outcomes, we assume

$$y_{itj}^* = \alpha_j' I_{it} + \beta_j' X_{it} + \delta_{tj} + c_{ij} + \epsilon_{itj} \quad i = 1, \dots, N, \quad t = 1994, \dots, 2005 \quad (1)$$

¹⁴This includes individuals currently in vocational training as well as workers that do not have any education at all.

¹⁵*Courses* refers to the attendance of job specific training courses at the beginning of employment.

¹⁶To be precise, children in Germany have to attend school for nine years regardless of their age. However, since most children enter schools at age six they are generally obliged to stay in education until they are 15. Henceforth, we refer to immigrants who entered the country at age 15 or below ('at compulsory school age') as the younger immigrants as well. Those immigrants who were 16 or older when migrating are referred to as the older or the majority of immigrants.

¹⁷*Work Hours* denotes actual monthly work hours computed by multiplying weekly hours by 4.4.

where $j = \{Q, M\}$ and y_{itj}^* denotes a latent, continuous variable underlying the observed outcomes y_{itj} . Since we analyze an unbalanced panel with respondents entering and exiting the data set at different points in time, t does not run over all twelve periods for each individual. Turning to the explanatory variables, I_{it} is a vector of dummies indicating the status of the immigrant, including three categories of *years since migration* and whether or not she immigrated at the compulsory school age of 15 years or younger. X_{it} denotes a vector of control variables comprising socio-economic and job specific factors such as age, marital status, number of household members and children, years of schooling, federal state dummies, firm size, field of occupation dummies, job tenure, a part-time indicator, and work hours. α_j , β_j , are parameter vectors measuring the impacts of the described covariates that have to be estimated and δ_{tj} is a vector of time dummies. c_{ij} is an individual-specific, time-invariant error component which we include to capture unobservable factors such as cognitive ability or motivation. Finally, ϵ_{itj} is assumed to be standard normal and uncorrelated with the regressors.

y_{itj}^* , the latent variables that are assumed to underly the observable categories y_{itj} are linked by

$$y_{itM} = \begin{cases} 0 & \text{if } y_{itM}^* \leq \tau \\ 1 & \text{if } \tau < y_{itM}^* \end{cases} \quad (2)$$

in the job mismatch model and by

$$y_{itQ} = \begin{cases} 1 & \text{if } y_{itQ}^* \leq \tau_{Q,1} \\ 2 & \text{if } \tau_{Q,1} < y_{itQ}^* \leq \tau_{Q,2} \\ \vdots & \\ 7 & \text{if } \tau_{Q,6} < y_{itQ}^* \end{cases} \quad (3)$$

in the skill requirement model. The required skills are ordered from *No Training* required coded 1 to *University Degree* coded 7. τ in the first and $\tau_{Q,1} < \tau_{Q,2} < \dots < \tau_{Q,6}$ in the second model are threshold parameter that have to be estimated along with the other model parameters. Equations (2) and (3) plus the normality assumption of ϵ_{itj} gave rise to the (ordered) probit model which could be estimated by maximum likelihood (ML) if c_{ij} was observable. Since we consistently utilize a specific approach to handle the unobservable, time-invariant error in all models, we will describe it after introducing the wage regression.

In the second step of our analysis, we estimate the effects of correcting for job conditions on the wage differentials between ethnic Germans and natives. This is achieved in a *Mincer*-type wage regression framework,

$$y_{it} = \alpha'_W I_{it} + \lambda' C_{it} + \beta'_W X_{it} + \delta_{tW} + c_{iW} + \epsilon_{it} \quad i = 1, \dots, N, \quad t = 1994, \dots, 2005 \quad (4)$$

where y_{it} denotes the natural logarithm of monthly gross wages and C_{it} is a vector of controls consisting of the job mismatch indicator, and 6 dummies for the different levels of job requirement, leaving *No Training* as the base group. X_{it} and I_{it} are defined as above.¹⁸

By estimating the wage assimilation profile using three dummies we deviate from the standard approach in the literature that does so by an immigrant indicator and a quadratic term of *years since migration*. We abstain from doing so due to data considerations. As is depicted in Table A2 and briefly discussed in the preceding subsection, we have very few observations for the first five years after arrival, in particular for the first two as the high mean of 4.3 years indicates. Hence, we are worried that the imprecision with which we assess these first years might yield somewhat misleading estimates of the initial disadvantage as well as the subsequent assimilation profile. However, the disadvantage of our method is that we cannot predict how many years are required to complete the assimilation process if this is not achieved within the maximal observed number of years of residency in the sample, in this case 18 years.

Let's now turn to the individual-specific, time-invariant error component c_{ij} ($j = \{Q, M, W\}$). Since we want to allow c_{ij} to be correlated with all other right-hand-side variables in each model, random effects is ruled out as a potential estimation strategy. Fixed effects approaches that fulfill this requirement suffer from two important shortcomings in this setting. Firstly, it is impossible to identify the full vectors α_j ($j = \{Q, M, W\}$) measuring the impacts of the immigration status I_{it} , which is the main purpose of the analysis. Furthermore, these models do not permit individual-specific, time-varying sample weights which are important in our investigation to obtain estimates that are representative for these two population groups.¹⁹

As an alternative to these approaches we therefore apply a specification suggested by Chamberlain (1984) and Mundlak (1978). Hence, we explicitly model the correlation between c_{ij} and the right-hand-side variables in the following linear fashion:

$$c_{ij} = \bar{X}_i' \theta_j + r_{ij} \quad (5)$$

¹⁸ X_{it} additionally contains a dummy indicating current participation in vocational training. This information is accounted for differently in the first-step estimations as we explain when discussing the empirical findings.

¹⁹The non-linear models further suffer from the problem that only those individuals can be considered that exhibit variation over time in the outcome which imposes a non-random selection criterion on the remaining subsample.

with $j = \{Q, M, W\}$, $\bar{X}_i = 1/T_i \sum_t X_{it}$ where T_i denotes the number of observations of respondent i in the sample, and r_{ij} is a random effect such that $E[r_{ij}|X_{it}, I_{it}] = E[r_{ij}] = 0 \forall t$. Note that we explicitly rule out a correlation between c_{ij} and I_{it} , a necessary assumption to identify α_j .²⁰ However, we believe that the amount of years spent in the host society and whether a migrant entered Germany at an age of less than 16 years are most likely not correlated with unobservable traits such as ability or motivation which would justify our assumption.

Plugging assumption (5) in models (1), and (4), respectively, suggests to utilize random effects estimators. Yet, due to the fact that random effects specifications do not allow individual sample weights, we estimate our models by pooled (ordered) probit and pooled OLS, respectively. These models are consistent, albeit, less efficient than the random effects specifications. In order to obtain valid test statistics, we compute *White* robust standard errors and additionally control for individual clusters.

Doubt about the consistency of the obtained estimates might arise due to the unbalanced nature of the analyzed panel. In fact, panel attrition might yield inconsistent point estimates if this decision is non-random in the sense that it is correlated with the considered outcomes as well as explanatory variables. Different variable addition tests suggested by Wooldridge (1995), however, indicate that sample attrition is no concern in our data.²¹

4 Results

4.1 Job Positions and Job Mismatches

In Table 1 we report the marginal effects of the length of stay of immigrants in the host country and whether they entered at compulsory school age on being employed in jobs with differing qualification requirements. In panel A results for the full sample are depicted, in panel B we exclude individuals currently enrolled in vocational training. The required skills steadily increase from $y = 1$ indicating *No Training* required to $y = 7$ referring to the necessity of holding a college degree. Once again we control for the full set of demographic and labor market specific controls outlined in **Section 3.1**, in particular years of schooling. A cursory look at panel A reveals that all but two depicted effects are statistically significant and

²⁰Equation (5) additionally includes the term $\bar{C}_i' \gamma$ when the wage regression is considered with $\bar{C}_i = 1/T_i \sum_t C_{it}$. Additionally, r_{iW} is assumed to be independent of C_{it} .

²¹These results are available upon request.

that the employment probabilities of the majority of ethnic Germans for all job categories approach those of comparable natives, though to a varying degree.

Whereas the estimated effects are economically negligible when *No Training* is required, they are substantial for jobs requiring training a worker obtains when employed in the company but which are not a prerequisite of being hired. These jobs comprise *Job Introduction* ($y = 2$), *On-the-Job Training* ($y = 3$), and *Courses* ($y = 4$). In all these categories immigrants have a higher employment probability than natives during the first five years which, however, diminishes substantially after more than a decade in the country. These figures support the hypotheses outlined in **Section 2.2**. Younger immigrants are somewhat less likely to work in these employment categories and therefore more similar to natives than the older group.

The final three columns contain the marginal effects on employment probabilities of jobs usually requiring specific certificates or degrees, where $y = 5$ refers to *Vocational Training* and $y = 6$ to *Technical School*. For all these jobs, employment probabilities of ethnic German immigrants are lower than for comparable natives. The biggest initial disadvantage of -16.1 % is found for vocational training stressing the particularly severe problems for immigrants to obtain employment in this highly restricted part of the labor market. Yet, on the other hand, these job positions also witness the largest catch-up, reducing this differential to merely -3.2 % on average after more than 10 years. The highest two job categories exhibit moderate employment disadvantages for immigrants. A rather surprising result is the finding that younger immigrants not only have a higher probability to work in such jobs than the older group but that they also appear to be more likely to be employed in jobs requiring a college degree than natives. However, a specification discarding individuals currently in vocational training (panel B) reveals that this factor is partially responsible for the slightly odd results of immigrants who entered the country at compulsory school age. While the general profiles of employment probabilities are almost unaffected, the absolute magnitude of all impacts estimated for younger immigrants is reduced for all categories.

To summarize results from Table 1, we find support for our hypothesis derived above. Many ethnic German immigrants start their careers in the host society with jobs requiring little or no particular training and then, after adjusting their human capital to the new labor market conditions, move out of these jobs and into employment requiring higher qualifications, in particular vocational degrees. This tendency might be augmented by an increasing knowledge of the labor market with time spent in the country as well as the convincing job performance of

immigrants letting them climb the job ladder. In general, the employment probabilities across qualification requirements seem to approach native levels and are reduced to gaps of no more than 5 % for every group which is a very strong signal of the integration capability of ethnic German immigrants. Probably, the entitlement to receive an official recognition of the degrees received in the home countries contributes to these results. Finally, it appears that immigrants who arrived in Germany at compulsory school age are more similar to natives than the majority of immigrants with the exception of the employment probability of jobs requiring vocational training.

The results for the incidence of a job mismatch are depicted in Table 2. Column (1) contains marginal effects utilizing the full sample. In column (2) we exclude workers enrolled in vocational training since per definition of the data they are all mismatched. The probability of a job mismatch of immigrants during the first five years of residency is roughly the same in these two specifications, about 26 to 30 % higher than the level of comparable natives. This discrepancy is more than cut in half in the following five years and reduced to about 5 to 8 % after more than 10 years. These last effects are insignificant in both specifications. Controlling for having immigrated at compulsory school age has no significant impact.

In columns (3) and (4), we additionally control for the skill requirements of the job by a set of dummies, omitting *No Training* required as the base group. The probability of a mismatch in the full sample, depicted in column (3), is lowest for jobs requiring vocational training. This stresses the high entry barriers to these jobs on the German labor market. Also employment in jobs requiring academic degrees is very unlikely without the adequate education. The more interesting effect from the perspective of this analysis, however, is the fact that the majority of immigrants now no longer is significantly more prone to job mismatches than natives. Once again dropping respondents currently in vocational training in column (4) does not change these main results. However, the impact for young immigrants drops sharply from 14 to 1 % yet is measured imprecisely in both specifications.

The findings in columns (1) and (2) support our hypotheses about an initially higher probability of a job mismatch for immigrants which is reduced with years of residence in the host society. However, taking into account job quality measured by the required skills, no significant difference between immigrants of German ethnicity and German natives remains. This is another very positive sign of the ability of this particular immigration group to find its way into the German labor market, probably partially explainable by the official recognition of their educational degrees.

4.2 Wage Assimilation

The final results of our study concern the impacts of the outcomes analyzed above on the wage assimilation of ethnic German immigrants. As a benchmark, we report the relative effects of the immigration indicators in a standard *Mincer*-type wage regression in column (1) of Table 3.²² The estimates suggest that the average wage disadvantage of immigrants during the first five years in the country is 17.5 %, is cut in half in the following five years and remains constant thereafter. Immigrants who entered the country at compulsory school age seem to face a considerably lower wage gap.²³ However, the reduction of about 6 % is estimated very imprecisely. Hence, it appears as if a substantial initial disadvantage was present for the majority of ethnic German immigrants which is reduced considerably within the first decade in the host country. Nonetheless, a permanent wage discrepancy of about 9 % seems to remain. Overall, almost two thirds of the wage discrepancy between natives and immigrants in the raw data is explained by socio-economic and job-specific characteristics.

A job mismatch reduces wages on average by about 3 % as is shown in column (2). This rather small point estimate might reflect the findings reported in the last two columns of Table 2. These suggest that mismatches mainly occur in the low-skilled sector where probably the wage gap induced by lacking the required skills is rather small. Since immigrants are more prone to mismatches as long as required job qualifications are ignored, it could further be expected that the wage gap between natives and immigrants is exaggerated. We find that adding

²²The relative effect of switching an indicator variable k from 0 to 1 on wages is computed as $\exp(\hat{\beta}_k) - 1$ following Halvorsen and Palmquist (1980) with $\hat{\beta}_k$ denoting the OLS parameter estimate.

²³There are three reasons why we would expect younger immigrants to be different in terms of wage differentials than the majority of immigrants. With *years since migration* we capture unobservable effects that influence labor income of immigrants. For each additional year on the labor market, due to not explicitly specified mechanisms, immigrants are assumed to catch up to natives on average. However, this measure is misleading for those immigrants entering the country as children since they spend a substantial part of their time in the host society in full-time education before they enter the labor market. A negative parameter estimate therefore could be interpreted as the correction of the systematic measurement error of their potential labor market experience captured by the *years since migration* indicators. A second effect, supposedly with the opposite sign, should be that they obtain German degrees which in turn should be fully recognized on the labor market, eliminating one of the obstacles typically faced by immigrants. Furthermore, during their time at school they should on average obtain better reading and writing skills than the older immigrants which in turn should be rewarded on the labor market (Dustmann, 1994).

the mismatch dummy to the wage regression yields only very small reductions of this discrepancy at all points in time compared to column (1). Considering the small impact of job mismatches on wages this is, however, not surprising.

Column (3) exhibits the impact of controlling for skill requirements. As expected, wages increase with required qualifications, though not completely monotonically. Furthermore, the wage gaps at all three points in time are reduced considerably compared to column (1). Finally, in column (4) we control for both factors simultaneously. Looking at the control variables, the mismatch indicator is closer to zero and loses significance. This is not totally surprising since we further control for skill requirements and years of education, the two factors determining the incidence of a job mismatch. The impacts of required qualifications are basically unchanged. Furthermore, the final picture of the wage assimilation is virtually unchanged compared to column (3). On average, the wage gap amounts to 13.2 % during the first five years. It is then reduced to merely 5 % in the following five years to finally increases again to 6.6 % after more than 10 years in the country. The difference between the last two effects is however not significant, hinting at a permanent wage disadvantage of ethnic German immigrants of 5 to 7 %. As mentioned above, our estimation strategy does not allow us to predict whether this effect will remain or might disappear after some more years on the host labor market.

The point estimate of the younger group indicator is slightly positive, yet, as in all specifications, insignificantly different from zero. Hence, no apparent difference in wage assimilation between immigrants who entered at compulsory school age vis-à-vis the majority of immigrants can be found. Yet, this implies that finishing school education in the host country reduces the initial wage disadvantage faced by the majority of ethnic Germans substantially since younger immigrants are on average already 10.6 years in the country when they are hired for the first time. In fact, F-tests of the joint significance of *Under 16* and being in the country for up to ten years and more than ten years, respectively, reject this null at any reasonable significance level in all four specifications.²⁴ Hence, we conclude that ethnic German immigrants who enter the country at compulsory school age on average are indistinguishable from natives when they enter the labor market.

Overall, our findings seem to be roughly in line with the last hypothesis from **Section 2.2**. The strong link between vocational education and job accessibility hampers considerably the transferability of human capital acquired in foreign

²⁴Only one of the young immigrants enters the labor market within the first five years of residency in Germany.

countries. Especially, controlling for skill requirements of jobs helps to explain a significant part of the estimated wage assimilation profile of immigrants. To assess the full impact of the allocation mechanism, we compare the profile from column (4) to the estimates in column (1). The initial wage differential is reduced by 24 %, the average gap after 6 to 10 years diminishes by as much as 43 %. Finally, the discrepancy after more than a decade is reduced by 26 %.

5 Conclusion

In this study we assess the impact of job entry restrictions on the economic integration of ethnic German immigrants who entered Germany after the fall of the iron curtain using eleven waves of the *German Socio-Economic Panel* (GSOEP). Starting from the theory of human capital transferability (Chiswick, 1978) we derive hypotheses why immigrants should face disadvantages vis-à-vis natives on labor markets that closely link job access to specific vocational education. We further argue that these handicaps should vanish with years of residence in the host country. To evaluate these claims we analyze the job mismatch probability as well as the employment probabilities in jobs that vary by the type of qualifications they require. In a second step of our analysis we investigate how controlling for these two factors affects estimates of the wage assimilation profile of immigrants.

Our findings in general confirm the derived hypothesis concerning job entry restrictions. Ethnic Germans face a substantially higher job mismatch probability which however disappears after on average slightly more than ten years in the country. Furthermore, this excess propensity is virtually completely determined by the jobs immigrants are employed at along their career. While, as predicted, they are more likely than natives to be hired in employment requiring low formal training during the first years after arrival, subsequently they climb the job ladder to levels very close to those of natives. Since mismatch rates are highest for low skilled jobs, this job transition renders the entire mismatch profile insignificant.

Finally, we assess the wage assimilation of ethnic German immigrants towards natives. Our results suggest that the wage gaps along the earnings profile are reduced considerably when we control for the three previously analyzed factors. We estimate that an average earnings disadvantage of 13.2 % in the first five years in Germany diminishes to slightly more than 5 % after more than a decade in the host society. This discrepancy seems to have permanent character since we don't find evidence for further assimilation for immigrants having spent more than 10 years in the country. A last important finding is that immigrants who entered Germany at compulsory school age and consequently received their school degrees

in the host society on average are undistinguishable from natives when they enter the labor market. This completes the, in our view, relatively positive picture of the labor market integration of ethnic German immigrants who entered the country since the fall of the iron curtain.

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Tables

TABLE 1 - REQUIRED QUALIFICATIONS
ORDERED PROBIT MARGINAL EFFECTS

A. Full Sample							
	P(y=1)	P(y=2)	P(y=3)	P(y=4)	P(y=5)	P(y=6)	P(y=7)
Years since Migration							
1 to 5	0.0127 (0.0072)	0.0828** (0.0323)	0.1074** (0.0289)	0.0560** (0.0105)	-0.1606* (0.0680)	-0.0557** (0.0071)	-0.0425** (0.0043)
6 to 10	0.0068** (0.0020)	0.0531** (0.0113)	0.0783** (0.0133)	0.0448** (0.0065)	-0.0964** (0.0253)	-0.0480** (0.0049)	-0.0386** (0.0034)
More than 10	0.0025* (0.0010)	0.0241** (0.0077)	0.0412** (0.0115)	0.0262** (0.0067)	-0.0338* (0.0159)	-0.0322** (0.0065)	-0.0281** (0.0047)
Under 16	-0.0009** (0.0002)	-0.0138** (0.0023)	-0.0337** (0.0066)	-0.0277** (0.0064)	-0.0660 (0.0387)	0.0593** (0.0186)	0.0829* (0.0347)
41,533 Observations, Pseudo R-Squared: 0.290.							
B. Individuals currently in vocational training excluded							
	P(y=1)	P(y=2)	P(y=3)	P(y=4)	P(y=5)	P(y=6)	P(y=7)
Years since Migration							
1 to 5	0.0110 (0.0066)	0.0793* (0.0328)	0.1059** (0.0305)	0.0555** (0.0112)	-0.1512* (0.0693)	-0.0573** (0.0078)	-0.0432** (0.0046)
6 to 10	0.0064** (0.0020)	0.0536** (0.0118)	0.0802** (0.0140)	0.0455** (0.0067)	-0.0957** (0.0263)	-0.0503** (0.0052)	-0.0397** (0.0036)
More than 10	0.0020* (0.0009)	0.0215** (0.0074)	0.0382** (0.0116)	0.0244** (0.0068)	-0.0273 (0.0147)	-0.0315** (0.0070)	-0.0274** (0.0050)
Under 16	-0.0007** (0.0002)	-0.0108** (0.0034)	-0.0260** (0.0096)	-0.0206* (0.0086)	-0.0355 (0.0334)	0.0417 (0.0218)	0.0520 (0.0330)
39,865 Observations, Pseudo R-Squared: 0.294.							
Robust, cluster-adjusted standard errors in brackets, **, *: significant at the 1%, 5% level. Year, State, and Occupation Dummies included in both models. Further Controls: Years of Schooling, Firm Size, Work Hours, Part-Time indicator, Tenure, Age, Number of HH Members (Kids), Marital Status.							

TABLE 2 - JOB MISMATCH

PROBIT MARGINAL EFFECTS

	(1)	(2)	(3)	(4)
Years since Migration				
1 to 5	0.2641** (0.0920)	0.3037** (0.0954)	0.0271 (0.1067)	0.0846 (0.1052)
6 to 10	0.1288* (0.0550)	0.1329* (0.0577)	-0.0521 (0.0615)	-0.0637 (0.0613)
More than 10	0.0516 (0.0544)	0.0828 (0.0556)	-0.0843 (0.0537)	-0.0491 (0.0542)
Under 16	-0.0168 (0.0759)	-0.0728 (0.0826)	0.1441 (0.0899)	0.0105 (0.1091)
Required Qualification				
Job Introduction			-0.0083 (0.0479)	-0.0071 (0.0491)
On-the-Job Training			-0.1393** (0.0426)	-0.1467** (0.0416)
Courses			-0.1853** (0.0390)	-0.1889** (0.0367)
Vocational Training			-0.4720** (0.0388)	-0.4778** (0.0398)
Technical School			-0.3735** (0.0185)	-0.3582** (0.0161)
College			-0.4042** (0.0270)	-0.3968** (0.0250)
Observations	41,533	39,865	41,533	39,865
Pseudo R-Squared	0.199	0.203	0.346	0.363

Robust, cluster-adjusted standard errors in brackets, **, *: significant at the 1%, 5% level. Year, State, and Occupation Dummies included in each model. Further Controls: Years of Schooling, Firm Size, Work Hours, Part-Time indicators, Tenure, Age, Number of HH Members (Kids), Marital Status.

TABLE 3 - WAGE REGRESSIONS

POOLED OLS, RELATIVE EFFECTS OF INDICATOR VARIABLES REPORTED

	(1)	(2)	(3)	(4)
Years since Migration				
1 to 5	-0.1748** (0.0363)	-0.1610** (0.0386)	-0.1335** (0.0460)	-0.1322** (0.0463)
6 to 10	-0.0877** (0.0207)	-0.0816** (0.0208)	-0.0489* (0.0222)	-0.0498* (0.0222)
More than 10	-0.0892** (0.0283)	-0.0845** (0.0282)	-0.0657* (0.0288)	-0.0663* (0.0287)
Under 16	0.0631 (0.0489)	0.0584 (0.0484)	0.0285 (0.0471)	0.0297 (0.0471)
Job Mismatch		-0.0288** (0.0098)		-0.0172 (0.0101)
Required Qualification				
Job Introduction			0.0447 (0.0320)	0.0447 (0.0320)
On-the-Job Training			0.0887* (0.0360)	0.0874* (0.0361)
Courses			0.0764* (0.0379)	0.0740 (0.0380)
Vocational Training			0.1094** (0.0356)	0.1020** (0.0359)
Technical School			0.1801** (0.0420)	0.1712** (0.0423)
College			0.1718** (0.0438)	0.1633** (0.0439)
R-Squared	0.653	0.655	0.663	0.663

Robust, cluster-adjusted standard errors in brackets, **, *: significant at the 1%, 5% level, 41,533 Observations. Year, State, and Occupation Dummies included in each model. Further Controls: Years of Schooling, Firm Size, Work Hours, Part-Time and Vocational Training indicators, Tenure, Age, Number of HH Members (Kids), Marital Status.

TABLE A1 - INDEPENDENT VARIABLES, SOURCE: GSOEP, 1994 - 2005, OWN CALCULATIONS

	Natives			Ethnic German Immigrants by years since migration					
	Mean	Std.	Dev.	1 - 5 years		6 - 10 years		>10 years	
	Mean	Std.	Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Labor Income	2,718	1,642		1,621	531.6	1972	718.1	2098	1,199
Job Mismatch	0.394	0.489		0.738	0.443	0.586	0.493	0.551	0.498
Required Qualification									
No Training	0.018	0.134		0.141	0.350	0.048	0.215	0.014	0.117
Job Introduction	0.069	0.254		0.299	0.461	0.237	0.426	0.151	0.359
On-the-Job Training	0.086	0.280		0.150	0.360	0.199	0.400	0.168	0.374
Courses	0.060	0.238		0.089	0.287	0.037	0.190	0.037	0.188
Vocational Training	0.545	0.498		0.241	0.431	0.449	0.498	0.574	0.495
Technical School	0.055	0.228		0	0	0.008	0.087	0.016	0.125
College	0.167	0.373		0.079	0.272	0.022	0.146	0.041	0.198
Observations	40,419			72		477		565	

All numbers are weighted.

TABLE A2 - DEPENDENT VARIABLES, SOURCE: GSOEP, 1994 - 2005, OWN CALCULATIONS

	Natives		Ethnic German Immigrants by years since migration					
			1 - 5 years		6 - 10 years		>10 years	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Years since Migration			4.335	0.807	8.138	1.324	13.24	1.863
Under 16			0.013	0.113	0.115	0.319	0.343	0.475
Years of Schooling	12.45	2.708	11.45	2.126	11.59	2.043	11.79	2.010
Age	40.26	10.49	37.18	11.06	37.84	9.790	36.69	10.73
Married	0.569	0.495	0.803	0.400	0.764	0.425	0.731	0.444
HH Members	2.728	1.270	3.801	1.278	3.813	1.543	3.531	1.756
Kids (0 to 14)	0.504	0.828	1.036	0.985	0.987	1.279	0.732	1.155
Kids (15 to 18)	0.154	0.409	0.269	0.547	0.401	0.680	0.330	0.630
Work Hours	192.3	43.14	181.3	36.43	180.7	32.01	179.1	29.80
Part-Time	0.116	0.321	0.308	0.465	0.134	0.341	0.183	0.387
Vocational Training	0.033	0.178	0.036	0.188	0.075	0.264	0.079	0.270
Firm Size (Number of Employees)								
1 to 19	0.227	0.419	0.287	0.456	0.273	0.446	0.194	0.396
20 to 199	0.275	0.447	0.470	0.503	0.364	0.482	0.332	0.471
200 to 1999	0.208	0.406	0.164	0.373	0.260	0.439	0.274	0.446
2000 and more	0.260	0.439	0.079	0.271	0.099	0.299	0.196	0.397
Self-Employed /	0.030	0.170	0	0	0.004	0.063	0.005	0.068
No Co-workers								
Tenure	10.90	10.14	1.738	1.340	4.186	2.333	5.905	4.259
Observations	40,419		72		477		565	

All numbers are weighted.