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Assimilation, Labour Market Experience, and Earnings Profiles of Temporary and Permanent Immigrant Workers in Germany

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by

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Abstract

We test the assimilation hypothesis as initially proposed by Chiswick (1978) by making use of a rich panel data set for Germany which allows us to control for unobserved population heterogeneity and potential selectivity bias arising from an individual's re-migration decision and employment behaviour. To take into account the institutional aspects of the German guest-worker system we use information on an immigrant's expected duration of stay in Germany to distinguish between temporary and permanent migrants and to test for differences in earnings/experience profiles with respect to a foreigner's expected duration of stay. We find that years of schooling in Germany have a strong positive effect on earnings, that earnings/experience profiles of guest-workers differ by expected duration of stay, and that the renumeration of labour market experience in Germany is higher for natives than for most foreigners. The assimilation hypothesis is therefore not supported by the evidence for Germany.

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1 Introduction

A question of great concern for economists and policy makers alike is the extent and speed with which immigrants adapt to the new working environment in host countries. Although the assimiliation of foreigners has various facetes, economists tend to focus on its effects on individual earnings. Given that labour market success is highly correlated with an individual's earnings, which are relatively easy to measure and a rather objective indicator for economic success, this seems a useful way to look at the assimiliation issue.

In this context, a popular hypothesis is that immigrants' starting wages immediately after arrival in the host country are relatively low, but adjust rather rapidly to, and may eventually even overtake, the earnings of natives with comparable measured characteristics. In his seminal study Chiswick (1978) has explained this earnings adjustment process by a straightforward application of human capital theory and the argument that immigrants are positively self-selected with respect to some productivity-related unobserved characteristics. Following this approach, researchers have confirmed this 'assimilation' hypothesis for the U.S., which has usually been interpreted as supportive of human capital theory in general.

For the following reasons, the question whether this hypothesis is indeed an appropriate description of the assimilation of immigrants in the host country is not only of purely academic interest but may also have some implications for immigration policy. First, if a low wage rate of newly arrived immigrants is only a temporary phenomenon it need not be a matter of much concern as immigrants are unlikely to depend on the public welfare system. Second, to the extent that the wage reflects an individual's productivity, the host country will benefit from immigration as it, far from being a burden on the national economy, actually contribute to higher productivity.

However, the assimilation hypothesis has recently been criticized on the grounds that the positive correlation between earnings and years since migration observed in cross-section data need not derive from the assimilation of immigrants acquiring relevant labour market experience in the host country, but may rather be a statistical artifact due to the failure to adequately control for unobserved 'quality' differences between successive cohorts of immigrants. Although there is some evidence for this latter interpretation (see, e.g., Borjas, 1985), so far no consensus on the assimiliation versus 'quality' issue seems to exist.

One aim of the present study will be to shed some new light on this issue by estimating earnings equations on individual panel data which allows us to control more effectively than in previous studies for unobserved population heterogeneity. Another aim will be to account for the institutional features of the German labour market, where temporary migrant workers known as 'guest-workers' ('Gastarbeiter') are quite common and concentrated on a few source countries, especially Turkey, Yugoslavia and Italy. With the exception of the study by Dustmann (1990), who finds for a single cross-section that expected duration of stay increases migrants' earnings, there is hardly any evidence whether the assimilation process of immigrants depend on their time-horizon.

In this study we try to distinguish between temporary and permanent migrants by using information on expected duration of stay in the host country. In particular, we will test for differences in earnings/experience profiles with respect to planned duration of stay in Germany. The econometric model is based on an extended form of the Mincer earnings function including interaction terms of an individual's labour market experience with expected total duration of stay in Germany and controlling for both observed and unobserved heterogeneity by using panel data on a large number of individuals for the six-year period 1984 to 1989.

The remainder of this paper proceeds as follows. The next section critically reviews the assimilation hypothesis as set out by Chiswick (1978) and summarizes some recent research referring to it. In section 3 we provide some relevant information on foreign workers in the German labour market, which forms the starting point for the following econometric analysis. The econometric model is set out in some detail in section 4. The main results of the study are discussed in section 5, while section 6 concludes with a summary. Some supplementary material is contained in the appendix.

2 The Assimilation Hypothesis

Following Chiswick (1978) the empirical tool of analysis in the majority of studies investigating the earnings adjustment of immigrants has been the estimation of standard earnings functions based on the theory of human capital (Mincer, 1974) including 'years since migration' as an additional regressor. Estimation has usually been on census cross-sections with standard controls for personal characteristics and some labour market indicators. A positive coefficient on (the linear term of) this variable and a smaller starting wage for foreigners have usually been interpreted as evidence in favour of the assimilation hypothesis.

Based on this approach, various researchers have usually found rather high assimilation coefficients implying that immigrants' earnings adjust quite rapidly to those of natives and eventually even overtake them[1]. For example, in the influential study by Chiswick (1978) this 'overtaking' point was estimated at roughly thirteen years after entry into the United States.

The explanation for these remarkable results basically relies on the following set of hypotheses:

(i) due to the depreciation of the value of human capital aquired in the home country the starting wage of immigrants immediately after arrival is considerably lower than the wage of nationals;
(ii) due to the increased investment in human capital undertaken to adjust to the needs of the new working environment earnings profiles of immigrants are much steeper than those of comparable nationals in subsequent years; and

1 For summaries of the relevant studies which mainly refer to the U.S. see Greenwood/McDowell (1986); Borjas (1990); Pischke (1992). Related studies for several European labour markets include Aguilar/Gustafsson (1991) for Sweden; Kee (1993) for the Netherlands; Pischke (1992) and Schmidt (1992) for Germany.

(iii) immigrants' earnings eventually may even overtake those of nationals, where this earnings crossover is the more likely the stronger is the self-selection of immigrants with respect to qualifications valued highly in the host country.

Whereas propositions (i) and (ii) follow from a straigthforward application of traditional human capital theory, proposition (iii) may seem less familiar. After all, why should foreigners who will eventually have the same human capital endowment earn even more than natives? The answer simply is that foreigners, having self-selected themselves into the immigration market, are in some way more productive than their native counterparts, where productivity is related to unobserved individual characteristics, such as work ethos, drive, entrepreneurship, and so on.

This convential view of how immigrants assimilate into the U.S. labour market has recently been challenged on the grounds that the observed positive relationship between earnings and years since migration may be due to a change in the composition of immigrants. Briefly, the argument is that, if immigrants' characteristics related to productivity ('quality') have deteriorated between successive cohorts and/or re-migration weeds out the least productive migrants, simply comparing earnings of successive cohorts of immigrants or relating them to years since migration will give no information on the earnings adjustment with labour market experience in the host country (Borjas, 1985; 1987).

The 'quality' issue has been the focus of the study by Borjas (1985) and a number of more recent contributions (see, e.g., Chiswick, 1986; LaLonde/Topel, 1990, 1991; Borjas, 1991; Friedberg, 1991) which are based on 'synthetic' cohort data constructed from two census cross-sections for 1970 and 1980. Although these studies produce somewhat ambiguous results, the convential wisdom now seems to be that 'quality' of immigrants has in fact deteriorated due to a change in immigration policy.

Related to the 'quality' issue is the question how the correlation between earnings and 'years since migration' in cross section data is affected by the self-selection of foreigners with respect to their re-migration decision. Theoretically, remigrats may be selected from the lower as well as the upper end of the earnings distribution, where the former can be rationalized as an initially unplanned event by imperfect information arguments (see, e.g., Lam, 1986) and the latter by the hypothesis of intertemporal substitution in labour supply (see, e.g., Stark/Galor, 1991). Although the importance of it has been stressed by various researchers (see, e.g., Stark/Bloom, 1985; Bloom/Gunderson, 1991), so far there is little knowledge about the likely effect of re-migration on measured 'assimilation' in the labour market, which could be obtained from estimates based on panel data (see Borjas, 1989).

Empirical research on the assimilation hypothesis has taken the Chiswick (1978) extension of the human capital earnings function for granted[2]. Given that the interpretation of the earnings equation is in terms of the Mincer (1974) model, this can be criticized on theoretical grounds. As suggested by Dustmann (1990), a

2 For an alternative interpretation of the assimilation hypothesis for the German labour market in terms of a matching model see Schmidt (1992).

straightforward re-interpretation of the time-horizon implicit in the Mincer earnings function implies that in addition to years since migration the total expected duration of stay in the host country has to be included in the earnings function.

Empirically, this extension may seem inessential where immigration is more or less a permanent affair, but is potentially important for countries where the total duration of stay varies a lot, as it is the case within the German guest-worker system. In our econometric model we will therefore include interaction terms of an individual's expected duration of stay in Germany with labour market experience as explanatory variables in the estimated earnings equation.

3 Foreign Workers in the German Labour Market

In this section we present some facts on earnings and the employment behaviour of 'guest workers' and a comparision with natives. For the former we also report some indicators of their actual and expected duration of stay in Germany. This descriptive analysis which forms the starting point for our econometric investigation is based on the first wave of the German Socio-Economic Panel (SOEP) for the former West-German states ('Länder'). In the first wave some 12,000 individuals in about 6,000 households were interviewed on a large number of personal and household characteristics as well as on education, training and labour market experience (for a description of the SOEP see Wagner/Schupp/Rendtel, 1991).

The analysis is restricted to the subsample of males between 18 and 65 years of age, excluding civil servants, apprentices and the self-employed. Females are not included in the sample because there are important differences in their earnings determination process with respect to marital status (Licht/Steiner, 1991), and to take them into account in our econometric model is well beyond the scope of the present paper.

Foreigners from the main source countries for guest-workers, ie. Turkey, Yugoslavia, Italy, Greece and Spain, have deliberatety been oversampled in the SOEP. This provides a unique opportunity to analyse the German guest-worker system in some detail, and also allows to account for expected sample attrition due to re-migration. For these groups, our data base also contains relevant information for describing the assimilation process in Germany. As relevant information for other foreigners is not available in the SOEP, foreigners always refer to these main source countries for guest-workers.

In Table 1 we present some 'stylized facts' on differences in earnings and employment patterns between natives and immigrants. The distribution of foreigners by nation of origin in the bottom line of the table shows that roughly a third of all 'guest workers' from the five traditional source countries are Turks. The proportions of Italiens and Yugoslavs are of roughly equal size, while Greeks and Spaniards are of lesser quantitative importance. Overall, this numbers are in accordance with those reported in official statistics (Statistisches Bundesamt, 1991, p. 72).

Table 1. Selected labour market characteristics of foreigners by nation of origin and for natives in 1984

	Nation of Origin					Natives
	Turkey	Yugosl.	Italy	Greece	Spain	
Monthly Gross Wage[1] (DM)	2615.5	2987.4	2620.5	2751.8	2637.3	3336.4
..in % of the native wage	78.4	89.5	78.5	82.5	79.0	100.0
Weekly Normal Working Hours[1]	40.4	40.5	41.1	40.2	40.2	40.8
Schooling (years)	12.9	12.9	12.7	13.0	12.8	13.8
Employment Ratio (in percent)	81 7	91 1	88.3	83.2	83.6	80.5
Labour Market Experience (years)	17 7	22.1	20.5	22.9	21.8	19.5
Number of individuals	503.0	258.0	333.0	226.0	214.0	3188.0
..in % of all foreigners	32.8	16.8	21.7	14.7	14.0	—

1) Employees only; average number of hours worked per week in the month before the interview.

Source: German SOEP (West), wave 1, own calculations.

As the table also clearly shows, natives have, on average, earned considerably more in 1984 than immigrant workers. Among the latter, workers from Yugoslavia earn considerably more than other foreigners. Whereas there are relatively modest differences in actual working time, labour force attachment as measured by a group's employment ratio differs substantially by nation of origin; Yugoslavs have the highest employment ratio, followed by Italiens, while Germans have the lowest ratio.

Turning to the usual human capital variables, we find a slighty higher number of years of schooling for natives and virtually no differences among foreigners. There are, however, remarkable differences in years of labour market experience, with Yugoslavs and Greeks having more years of labour market experience than any other group including Germans[3]. In this context it should be noted that an important advantage of the SOEP is that an individual's labour market experience can be calculated quite accurately as our data base contains detailed information on work experience as well as the timing and duration of non-employment spells.

In Table 2 we report various measures of lenght of stay in Germany for the five groups of foreigners. In the first part of the table the distribution of 'years since migration' by nation of origin is given. Although this variable is recorded in years, we prefer to split it into five intervals because responses to this question are heavily bunched at certain years, ie. one, three, five, ten, etc, thus contaminating this variable with large measurement errors.

3 These comparisions do, however, not condition on age.

Overall, the distribution of 'years since migration', referring to the year 1984, for the various groups corresponds to the immigration 'waves' reported in the literature (see, e.g., Franz, 1991; Schmidt/Zimmermann, 1992). In particular, the relatively high proportion of foreigners who have been in Germany for 14 to 22 years in 1984 can be related to the then prevalent policy by the federal labour office of actively hiring guest-workers by recruitment treaties with various countries.

Looking at the distribution of the variable 'expected length of stay', we observe for all groups that the durations are fairly evenly distributed, except for the '14 to 22' years category. There seems to be no obious reason for this peculiar pattern in our data. To calculate the variable 'total length of stay' we have simple added years since migration and expected length of stay, and doubled the upper bound of the category accordingly. For this measure, the mass of the distribution falls on the '15 to 26 years' category.

Not surprisingly, there are only a few foreigners whose total length of stay in Germany is less than six year, which is a consequence of the peculiar sampling scheme in the SOEP, where only those who lived here in 1984 are included, and the well-known length bias generally associated with point sampling. The former is a consequence of labour market policy which, following the first oil price shock, halted recruitment of guest-workers as a response to the huge increase in unemployment. Although there has been continuing immigration of guest-workers' relatives since then, inflows from these countries have been small compared to former levels. This fact together with the mentioned length bias imply that guest-workers with short durations of stay in Germany will be underrepresented in our sample which may therefore not be very informative on the initial process of assimilation. This unfortunate feature of our data base should be borne in mind when interpreting the results of our econometric model, to which we now turn.

Table 2. Years since migration, expected length of stay, and total length of stay of foreigners by nation of origin in 1984

	Nation of Origin[1]				
	Turkey	Yugosl.	Italy	Greece	Spain
Years since Migration (percent)					
Less than 3 years	2.5	3.2	0.7	1.6	0.7
4 - 7 years	10.8	11.0	2.2	2.6	1.9
8 - 13 years	41.5	26.5	15.1	24.7	24.4
14 - 22 years	44.9	43.4	64.0	57.0	59.0
More than 22 years	0.3	16.0	18.0	4.2	14.1
Expected Length of Stay (percent)					
Less than 3 years	27.1	23.4	24.7	13.4	21.0
7 - 14 years	22.3	15.6	23.9	21.7	16.2
8 - 13 years	19.4	17.0	19.7	19.6	14.9
14 - 22 years	5.2	7.8	6.3	6.2	12.2
More than 22 years	26.1	36.2	25.3	39.2	35.8
Total Length of Stay[2] (percent)					
Less than 6 years	1.9	2.6	1.4	0.5	0.6
7 - 14 years	16.4	13.7	8.9	5.1	7.7
15 - 26 years	50.0	34.4	43.2	45.2	37.1
27 - 42 years	9.9	15.4	24.7	13.2	22.6
More than 42 years (permanent)	21.9	33.9	21.9	36.0	32.1

1) Guest-workers only; numbers refer to employees at the date of interview.

2) Total Length of Stay = Years since Migration + Expected Length of Stay

Source: German SOEP (West), waves 1-6; own calculations.

4 The Econometric Specification

In this section we specify an extended version of the standard human capital earnings function with selectivity both with respect to the re-migration decision and an individual's employment status by a simple extension of the standard two-step selectivity correction procedure proposed by Heckman (1979). Unobserved population heterogeneity is controlled for in the estimation by allowing for individual-specific effects in the earnings function. Estimation will on the first six waves of the German Socio-Economic Panel. Given our estimation procedure which requires at panel data, only individuals with at least two observations and complete information on all variables in the model can be used in the estimation.

Panel data have the great advantage over single cross-section data that unobserved heterogeneity can be controlled for in the estimation. However, they also have their own problems, in particular sample attrition and other missing data problems

(Griliches/Berndt/Hausman, 1978). In the present context, the estimation of earnings functions is complicated by the fact that wages of foreigners are only observed if they have not re-migrated until the date of interview and, given this condition, are employed at that date. The latter selection criterion is, of course, also a precondition for the observability of wages for natives.

Whereas sample attrition due to re-migration seems of modest quantitative importance, missing observations on wages due to non-employment at the data of interview is more frequent. More important than the number of missing observations, however, is the question whether they occur at random. If the earnings determination process and the processes governing sample attrition are correlated, and this is not adequately controlled for in the estimation procedure, biased and inconsistent parameter estimates of the earnings equation will result.

While the correction for selectivity bias with respect to employment status has, at least in cross-section studies, by now become standard, the potential bias arising from foreigners' re-migration decision has so far received little attention in the empirical literature. However, if re-migration is not completely at random but depends on an individual's success in the labour market, estimation of earnings functions on the subsample of stayers, will generally yield biased and inconsistent parameter estimates and result in an inappropriate inference on the assimilation hypothesis. As noted in section 2, this bias may go in either direction.

The proper way to account for these problems would be to explain individual earnings as well as employment and re-migration decisions within a simultaneous equation system. As this would involve the estimation of a system of equations with mixed discrete/continuous dependent variables and individual effects in each equation on an unbalanced panel-design this is well beyond the scope of the present paper[4]. As our main concern here is to secure consistent estimates of the parameters in the earnings equation, we adapt the much simpler two-step approach proposed by Lee (1981) as follows.

In the first step we estimate reduced-form re-migration and employment equations by simple reduced-form probit models, where we entertain the admittedly restrictive assumption that the error terms in these two equations are uncorrelated. As is well known (see, e.g., Maddala, 1983, pp. 282), the extension of the standard selectivity correction to two equations is straightforward under this assumption[5]. From the estimated parameters of the two reduced-form probits the selectivity correction terms, corresponding to the inverse of the Mill's ratio in each equation, can be calculated which are then included as additional regressors in the second-step estimation of the earnings equation. Given the validity of the maintained distributional assumptions this two-step procedure will yield consistent, although inefficient estimates of the parameters in the earnings equation.

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4 For a discussion of sample selectivity correction in unbalanced panels, although for rather simple models, see Veerbeck/Nijman (1992).

5 If this admittedly restrictive assumption is dropped, the calculations become more difficult (see, e.g., Maddala, 1983, p. 282). Since our sample contains only a few foreigners who actually re-migrated during the observation period we did not try to model a more realistic selection process which would, we feel, have asked too much from the data.

Somewhat more formally, the statistical model is given by the following equations;

(1) $REM_{it}^{*} = \beta_1' X_{1t} + u_{1it}$

(2) $EMP_{it}^{*} = \beta_2' X_{2t} + u_{2it}$

Eqns. (1) and (2) give the reduced form equations for the propensity to remigrate and the employment propensity for individual i at time period t, where X_{1t} and X_{2t} are matrices of explanatory variables, β_1 and β_2 are conformable vectors of regression coefficients and u_1, u_2 are error terms. Hence, each of these propensities is modelled as a latent continuous variable which is assumed to depend on a set of explanatory variables, some of which may appear in both equations, and an error term.

The dependent variables in eqns. (1) and (2) are not directly observable, but related to two dummy variables which state whether an individual has remigrated or stayed and, if so, whether he has been employed or non-employed when interviewed in a particular year. The relationship between the latent variables and their discrete counterparts is given by eqs. (3) and (4) as follows

(3) $$REM_{it} = \begin{cases} 1, \text{ if } REM_{it}^{*} > 0 \\ 0, \text{ otherwise} \end{cases}$$

(4) $$EMP_{it} = \begin{cases} 1, \text{ if } EMP_{it}^{*} > 0 \\ 0, \text{ otherwise} \end{cases}$$

Note that eq. (4) only refers to those individuals who have not remigrated until the date of interview. Thus, the sample is truncated by the re-migration decision and therefore is a non-random subsample of the relevant population. This would, of course, complicate matters if the error terms in the two equations were allowed to be correlated (for the relevant likelihood function in this case see, e.g., Maddala, 1983, p. 281).

As the left-hand side variables in eqns. (1) and (2) are not observable the variances of the error terms in these equations can be arbitrarly normalized, and the usual assumption is that they are standard normal with marginal distributions

(5) $$\begin{aligned} u_1 &\sim \Phi_1(0,1) \\ u_2 &\sim \Phi_2(0,1) \end{aligned}$$

Furthermore, $\text{cov}(u_1, u_2) = 0$ by assumption, which also implies that unobserved individual effects in the employment and re-migration equation are ignored. Hence, an individual's remigration and employment probabilities are given by the following probit models:

(6) $\Pr(REM_{it} = 1) = \Phi_1(\beta_1' x_{1t})$

(7) $\Pr(EMP_{it} = 1) = \Phi_2(\beta_2' x_{2t})$

Under the above independence assumption, ML estimates of the (standardized) parameters in eqns. (6) and (7) can be obtained by maximizing each single equation separately.

Given consistent estimates of the (normalized) coefficients in the re-migration and employment equations we can calculate the respective selectivity-correction terms which are given by

(8) $$\hat{\lambda}_{1it} = \frac{\phi_1(\hat{\beta}_1' x_{1t})}{\Phi_1(\hat{\beta}_1' x_{1t})}$$

(9) $$\hat{\lambda}_{2it} = \frac{\phi_2(\hat{\beta}_2' x_{2t})}{\Phi_2(\hat{\beta}_2' x_{2t})}$$

where ϕ is the standard-normal density function.

Under the independence assumption, the selectivity-correction procedure simply is to include these two terms as additional right-hand side variables into the earnings equation. Defining $\rho_1 = \mathrm{cov}(\varepsilon, u_1)$ and $\rho_2 = \mathrm{cov}(\varepsilon, u_2)$, the selectivity-corrected earnings equation can then be written as (Maddala 1983, p. 282)

(10) $$\ln W_{it} = \alpha_0 + \alpha_i + \sum_{k=1}^{K_1} \beta_k x_{kit} + \sum_{k=1}^{K_2} \gamma_k y_{kit} + \rho_1 \hat{\lambda}_{1it} + \rho_2 \hat{\lambda}_{2it} + \varepsilon_{it}$$

with

W_{it}	=	gross monthly earnings for individual *i* at *t*
α_0	=	'grand mean'
α_i	=	individual effects
x_{kit}	=	set of K_1 time-varying control variables
y_{kit}	=	set of K_2 human capital variables
β_k, γ_k	=	parameters to be estimated
ε_{it}	=	error term

The α_i account for time-invariant unobservable individual characteristics affecting earnings not included in the set of explanatory variables determining earnings. The error term ε_{it} is assumed to be white-noise and should account for time-varying effects such as aggregate labour market shocks and the like. Given our estimation procedure described below, the individual effects also account for a foreigner's individual characteristics such as nation of origin, schooling and labour market experience before immigration, which do not change within the observation period. To the extent that the date of immigration affects wages, the individual effects also absorb population heterogeneity arising from that source.

There are two sets of explanatory variables in the model. For definition of variables and summary statistics see the appendix. The time-varying control variables comprise an individual's normal working time, personal characteristics, occupational status, dummies for working conditions, firm size and industry dummies, and labour market indicators as well as dummies for region of residence and urban agglomeration. To control for occupational status and working conditions seem of particular importance in the present context as foreign workers are known to be concentrated in unskilled jobs with rather unattractive working conditions with respect to dirt, extreme temperature, noise etc.[6] The set of human capital variables that vary within the observation period includes years of schooling in Germany, SCHG, labour market experience after immigration, EXP, and its square, EXPSQ, and interaction terms of the latter variables with an individual's total expected length of stay in Germany. While most of the variables in the model seem self-explanatory, the human capital variables, and the latter variable in particular, may need some explanation.

For reasons discussed in the previous section, we have split up the variable years of expected length of stay in Germany into four categories ranging from STAY1, which refers to all observations with an expected duration of less than fourteen years, to STAY4 which refers to permanent stayers. These dummy variables are interacted with the linear and quadratic term of labour market experience to allow for differences in foreigners' earnings/experience profiles with respect to an individual's expected duration of stay in Germany. These interaction variables are all zero for natives who thus act as the reference group, and whose earnings/experience profiles are detemined by the coefficients on EXP and EXPSQ alone. For the assimilation hypothesis to be supported, one would expect steeper profiles for foreigners, and the more so the longer an individual's expected duration of stay in the host country.

The use of this duration variable to test the assimilation hypothesis could be criticized both on theoretical and econometric grounds. Theoretically, a foreigner´s expected duration of stay immediately after immigration may seem the more appropriate variable, assuming that individual decisions are taken under complete information after arrival in the host country. Our data base does, unfortunately, contain no direct information to construct such a variable[7]. Furthermore, given our estimation procedure described below, we would have to rely on the time-variation in this variable to test the assimilation hypothesis. From an econometric point of view the main problem with this variable is its potential endogeneity[8]. As we cannot think of valid instruments for this variable, as variables affecting an individual´s expected duration of stay will almost surely also

6 We assume that these variables can be treated as legitimate control variables in an earnings function with a basic human capital interpretation. For an alternative interpretation of earnings equations as hedonic price functions in the context of the labour market situation of Dutch immigrants see Hartog/Vriend (1990).

7 Schmidt (1992) tries to impute a foreigner's expected duration of stay in Germany at the beginning of his stay in Germany from observations of actual re-migration of all foreigners living in Germany in 1984 over the subsequent five years period. Since this seems to ask a lot from the data, to say the least we do not follow this procedure here.

8 For analyses of the determinants of the expected duration of stay of guest-workers in Germany see Dustmann (1992) and Steiner/Velling (1992).

affect wages, there seem to be no way to circumvent this problem, and we have therefore to live with a certain amount of ambiguity.

Turning to the estimation of the earnings equation, the distribution of the individual effects and the error term must first be specified. We assume that ε_{it} is uncorrelated with both the explanatory variables in the model and the α_i's which may be correlated with the latter variables. Given this assumption, the estimation procedure is conditional on the realization of the α_i's. We therefore apply the fixed-effects (FE) estimator, the main advantage of which is that it allows for unbiased coefficient estimates even if the individual effects are correlated with the explanatory variables in the model. Its main disadvantage is that only the time variation in the data is utilized. Hence, coefficients of variables with little time variation within the observation period cannot be estimated with any precision and may only be poorly identified. In order to account for sample attrition due to re-migration and non-employment we followed the suggestion by Baltagi (1985) and have adapted this standard procedure to allow for an unbalanced panel design, ie. a varying number of observations per individual.

Direct estimation of eq. (9) by OLS is not feasible as a very large number of individual effects would have to be included as dummy variables in the earnings equation. It is well known (see, e.g., Hsiao, 1986), however, that the individual effects can be purged from the estimating equation by subtracting the individual means from the raw observations. For our unbalanced panel design the transformation sweeping out the individual fixed-effects from the earnings equation amounts to

$$\bar{z}_{it} = z_{it} - \frac{1}{T_i}\sum_{t=1}^{T_i} z_{it}$$

where z_{it} is any variable in eq. (10).

OLS estimates of the transformed version of earnings equation will give unbiased estimates of the regression coefficients, although their standard errors may be inconsistent due to the two-step estimation procedure used for the selectivity-correction. Although adjustment of the estimated covariance matrix as suggested by Lee/Maddala/Trost (1980) does not seem feasible in the present context, it can be argued that the resulting inconsistency will show up in heteroscedasticity, which in fact was clearly indicated by results from standard statistical tests (Breusch/Pagan, 1979). When presenting estimation results, we will therefore report t-values based on heteroscedasticity-consistent standard errors as suggested by White (1980).

5 Estimation Results

Following the two-stage estimation procedure outlined in the previous section we first estimated reduced-form remigration and employment equations by pooled probit models. Estimation results for these equations are briefly summarized in the next subsection. Based on these estimates the selectivity-correction terms were calculated and included as additional regressors in the second-step estimation of

the earnings equation. As an individual's working time and labour market experience are usually viewed as endogeneous variables in the earnings equation we have re-estimated it with an instrumental variable (IV) procedure. While estimation results for the full model are relegated to the appendix, selected results for the selectivity-correction terms and the human capital variables based on the IV procedure are reported and briefly discussed in section 5.2. In section 5.3 the implications of these results for the assimilation hypothesis are illustrated by comparing earnings/experience profiles with respect to total duration of stay in Germany.

5.1 Reduced-Form Re-Migration and Employment Equations

Maximum likelihood estimation results for the re-migration equation are reported in Table A4 and for the employment equation in Table A5 in the appendix. As there are rather few observations for individuals who have remigrated within the observation period, we have pooled the years 1985 to 1989 to increase the number of observations for estimating the re-migration equation[9]. For the estimation of the employment equation we have pooled all observations within the observation period 1984 to 1989. Definitions and summary statistics of the variables used to estimate these two equations are supplied in the appendix. Although we are not going to discuss results for this reduced-form equations in any detail here, some comments seem in order.

First, it should be noted that just 1.5 percent of all observations within the observation period refer to re-migrants. It therefore comes as no surprise that most estimated coefficients in the re-migration equation are poorly determined. One of the few significant variables is potential labour market experience which reduces (with a decreasing rate) an individual's remigration probability quite substantially. Having a spouse in the home country and reporting serious health problems increases the re-migration probability significantly. The ability to speak German decreases this probability, whereas knowledge of written German has no statistically significant effect.

There seems to be little difference in re-migration behaviour by nation of origin, as shown by the insignificant coefficients on the respective dummy variables. In order to allow economic conditions in the home country influence an individual's decision to re-migrate, we have also included some basic economic indicators for the five countries under study as explanatory variables in the re-migration equation. However, these aggregate indicators seem to have no significant effect on an individual's re-migration decision.

Estimated coefficients for the variables in the reduced-form employment equation in most cases have the expected sign and are highly significant. The most important determinatns of an individual's employment probability seem to be 'potential labour market experience', measured as age minus schooling minus six years, the duration of unemployment prior to the first interview in 1984, household income other than own income, schooling and health disabibility. There are also

9 Due to the sampling scheme described in section 2 there was, of course, no need for a selectivity correction in 1984.

some significant effects from region and urban agglomeration. In contrast, with the exception of the higher employment probability of Spaniards, male employment behaviour does not differ much between foreigners and natives.

5.2 Earnings Equations

Detailed estimation results for the earnings equation including the selectivity-correction terms calculated from the first-step re-migration and employment equations are contained in Table A6 in the appendix. As an individual's labour market experience and working time are, for good economic reasons, often viewed as endogeneous variables in an earnings equation, we have also estimated the earnings equation by an instrumental variables procedure, the results of which are also reported in Table A6[10].

To obtain these instruments we have run fixed effects regression models including both selectivity terms and a large number of exogeneous variables. In the experience equation most of the variance is explained by 'potential labour market experience', whereas in the hours equation most of it is caught by the individual effects. Whereas the correlation between labour market experience and its instrument is extremely high, that for working time is not as good.

A comparision of the OLS and IV estimation results in Table A6 shows that estimated coefficients of the instrumented variables change somewhat in magnitude, whereas the results for the other variables remain fairly stable. The most pronounced difference is for the working time variable; based on the OLS estimates the implied elasticity of earnings with respect to this variable is 0.24, which seems rather low, whereas for the IV estimates this elasticity is 0.62. In contrast, the elasticity of earnings with respect to labour market experience, which will be discussed in more detail below, does not differ much between the OLS and the IV estimates. In order to discriminate between these two estimation procedures we have tried to test the null hypothesis that these variables are exogeneous in the econometric sense by standard statistical tests. However, we always ran into singularity problems when all experience terms were included in the test procedure. We have therefore decided to rely on the IV estimates for the moment on the grounds that, although we may lose in efficiency if these variables are in fact exogeneous, we will at least obtain consistent parameter estimates if this assumption is violated.

For easier reference we report selected IV estimation results from the full model in Table 3, where interpretation will focus on the selectivity correction terms and the central human capital variables. To start with, the coefficient on the selectivity-correction term with respect to the employment status is highly significant and bears the expected sign; unobserved factors that increase an individual's earnings

10 Results for simple OLS estimation on single cross sections and GLS panel estimates, not reported here but available on request, show much lower coefficients on the experience and schooling variables than the fixed effects estimates. Formal statistical tests indicate that individual effects are both quantitatively important and correlated with the explanatory variables in the model. Hence, if obtaining consistent parameter estimates is the main criterion, the fixed effects estimator seems preferable to both OLS and GLS.

have also a positive effect on his employment probability. In contrast, there seems to be, after conditioning on an extensive set of control variables, no correlation between an individual's wage and his propensity to remigrate.

Table 3. Selected results for earnings equations, males; fixed-effects model[1)]

Variable	Coefficient	t-value	F-value[2)]
RLAMBDA	-0.0001	-0.02	-
ELAMBDA	0.0408	3.18	-
GSCHOOL	4.4740	2.15	-
EXP	6.0168	13.84	-
EXPSQ	-4.4885	-8.63	-
EXP_STAY2	0.9823	1.90	3.50 (2, 10746)
EXPSQ_STAY2	-2.2045	-2.30	
EXP_STAY3	0.9873	2.01	3.97 (2.10746)
EXPSQ_STAY3	-2.2226	-2.45	
EXP_STAY4	0.9411	1.96	3.92 (2.10746)
EXPSQ_STAY4	-2.1119	-2.40	
EXP_STAY5	0.9686	2.02	4.35 (2.10746)
EXPSQ_STAY5	-2.2556	-2.57	
GSPEAK1	-0.0025	-0.27	1.24 (4,10744)
GSPEAK2	0.0184	1.31	
GWRITE1	-0.0092	-1.19	
GWRITE2	0.0004	0.02	

1) IV estimates; results for the included control variables, statistical tests and summary statistics are reported in Table A3

2) D.o.f. are in parentheses.

We want to stress, however, that the latter result may well be due to the peculiar sampling scheme in the SOEP where most of the re-migration of the included immigration cohorts probably has taken place before 1984. But even given this data restrictions, a more appropriate and efficient way to model re-migration behaviour would have been to relax the independence assumption and to estimate the two selection equations simultaneously by a bivariate probit model, which could help to obtain more efficient estimates.

As expected, years of schooling in Germany have a highly significant effect on wages where an additional year of schooling increases an individual's wage by roughly 4.5 percent, which seems within a plausible range. Somewhat surprisingly and contrary to the evidence for other countries (see, e.g., Chiswick, 1991), knowledge of neither spoken nor written German has a significant effect on wages. This is probably a consequence of our estimation procedure which only takes into account the time variation in the data, where for the language variables there is litte change in our sample of foreigners given their already long durations of stay in Germany at the beginning of the observation period. In contrast, estimated

coefficients for the experience variables and their interactions with expected duration of stay seem rather well determined and are highly significant. Furthermore, they imply the typical concave shape of the experience/earnings profile.

Due to the quadratic terms and the interactions with the duration dummies the interpretation of the effect of labour market experience on earnings is rendered somewhat difficult in Table 3. We have therefore calculated earnings elasticities, evaluated at each group's variable means. Somewhat surprisingly, these elasticities range only from 0.81 for foreigners with an expected total duration of stay of less than fourteen years to 0.92 for natives. Furthermore, if these elasticities are evaluated at the overall mean value of labour market experience in the sample the value is 0.90 irrespective of expected duration of stay in Germany.

5.3 Experience/Earnings Profiles

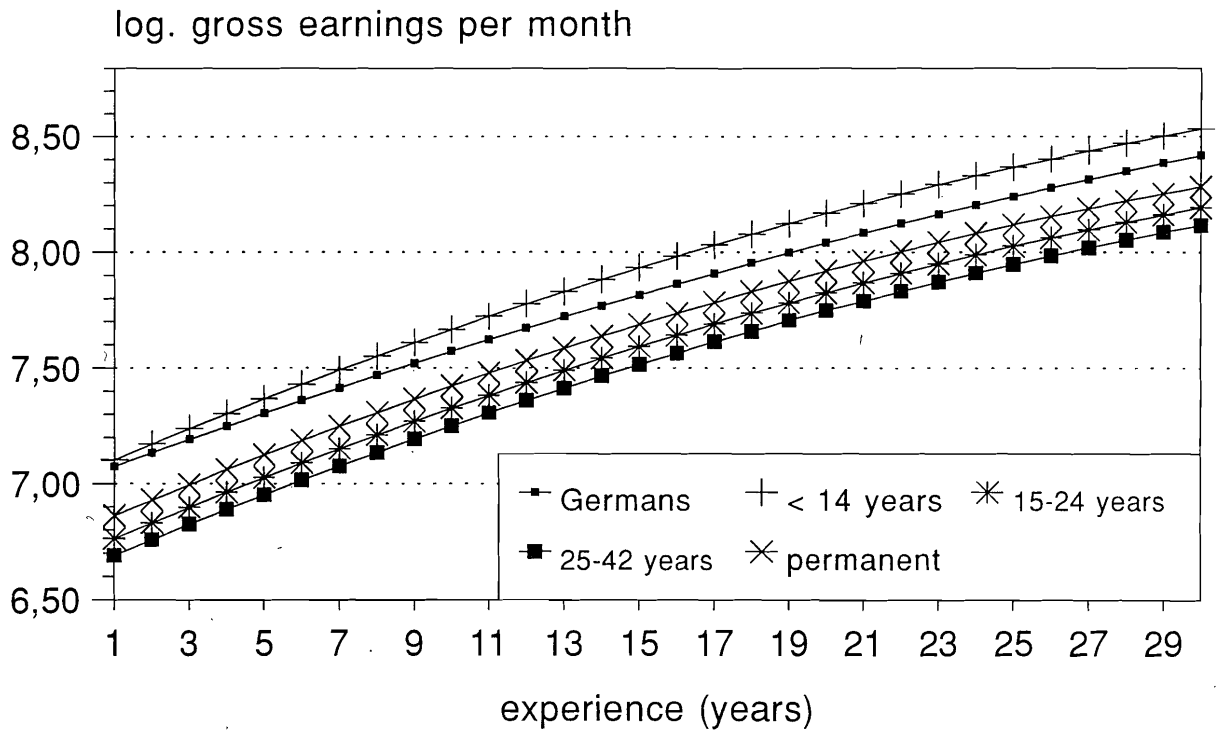
The implications of our estimation results for the assimilation hypothesis can best be illustrated by means of Figure 1, where we have plotted average earnings profiles for natives and foreign workers by expected total duration of stay in Germany. As the cut-off point is at 25 years, the experience/earnings profile with a total duration of stay of less than 25 years is, of course, only hypothetical. The earnings profiles in Figure 1 have been calculated at each group's variable means including the mean values of the estimated fixed effects for each group.

As shown in Figure 1 immigrants' earnings immediately after arrival in Germany are, except for the group of foreign workers with an expected duration of stay of less than 14 years, considerably lower than those of natives, and there seem to be only modest differences in the starting wages of the other foreigner groups. When interpreting this result one has to keep in mind that it is based on out-of-sample projections and the accuracy of the calculated starting wage may vary between the different groups.

Although immigrants real earnings do rise substantially with labour market experience, the assimiliation process as described in section 2 does not take place; if anything, earnings profiles of natives are steeper than those of foreigners with more than fourteen years of expected duration of stay in Germany. Only those foreigners with a shorter total duration of stay seem to have a somewhat steeper earnings profile than German workers within the relevant interval.

Figure 1. Estimated Experience/ Earnings Profiles

Germans and foreigners by expected duration of stay



Evaluated at group means of the explanatory variables including individual effects.

6 Summary and Conclusion

In this paper we have tried to tackle some of the problems that have recently been the focus of much research on the assimilation hypothesis as initially proposed by Chiswick (1978) for the U.S. by making use of a rich panel data set for Germany which allowed us to control for unobserved population heterogeneity and potential selectivity bias arising from an individual's re-migration decision and employment behaviour. Another important advantage of our data base is that it contains an immigrant's expected duration of stay in Germany, which allowed us to distinguish between temporary and permanent migrants and to test for differences in earnings/experience profiles with respect to an individual's duration of stay. To this end, we have estimated simple probability models for an individual's re-migration decision and employment behaviour and selectivity-corrected earnings equations for males based on the first six waves of the German Socio-Economic Panel (West).

The most important results of this study are as follows. Whereas unobserved factors that increase an individual's employment probability have also a strong positive effect on his earnings, there seems to be, after conditioning on an extensive set of control variables, no correlation between an individual's earnings and his propensity to re-migrate. With respect to the typical human capital variables we have found that years of schooling in Germany have a strong positive effect on earnings, and the renumeration of labour market experience in Germany for foreigners is higher for natives than for most foreigners. The assimilation hypothesis is therefore not supported by the evidence for Germany.

In particular, we have shown that, except for those with a relatively short duration of stay, immigrants earnings are considerably lower after arrival in Germany and rise less steeply with the accumalation of labour market experience than the earnings of natives. However, at arrival in Germany earnings of foreign workers' with a relatively short expected duration of stay are roughly equal to those of natives, and the growth of earnings of the former within the next couple of years is even higher than for Germans. A possible explanation for these differences is that members of this group are particularly hard working during their relatively short stay in Germany, whereas the other groups, having not re-migrated within a comparable time period, mainly consist of negatively self-selected foreigners.

Appendix

Table A1. Variable means - Earnings equation

Variable	Overall	Germans	< 14 Y.	15-26 Y.	27-44 Y.	Perman.
EARNINGS	3313.534	3544.174	2622.254	2804.104	2972.656	2918.142
LN_EARNINGS	8.047	8.107	7.836	7.908	7.969	7.949
ELAMBDA	-0.232	-0.247	-0.240	-0.201	-0.167	-0.227
RLAMDA	-1.593	-1.000	-2.807	-2.760	-2.666	-2.708
WTIME	39.933	39.992	40.281	39.863	39.715	39.787
LN_WTIME	3.684	3.685	3.694	3.683	3.680	3.682
LN_WTIMP	3.759	3.746	4.336	3.766	3.782	3.727
EXP	0.234	0.232	0.141	0.239	0.275	0.226
EXPSQ	0.069	0.068	0.026	0.069	0.086	0.063
EXP_STAY2	0.002	0.000	0.141	0.000	0.000	0.000
EXPSQ_STAY2	0.000	0.000	0.026	0.000	0.000	0.000
EXP_STAY3	0.032	0.000	0.000	0.239	0.000	0.000
EXPSQ_STAY3	0.009	0.000	0.000	0.069	0.000	0.000
EXP_STAY4	0.023	0.000	0.000	0.000	0.275	0.000
EXPSQ_STAY4	0.007	0.000	0.000	0.000	0.086	0.000
EXP_STAY5	0.026	0.000	0.000	0.000	0.000	0.226
EXPSQ_STAY5	0.007	0.000	0.000	0.000	0.000	0.063
EXPP	0.238	0.235	0.173	0.243	0.279	0.228
EXPSQP	0.073	0.072	0.065	0.074	0.091	0.065
EXPP_STAY2	0.003	0.000	0.173	0.000	0.000	0.000
EXPSQP_STAY2	0.001	0.000	0.065	0.000	0.000	0.000
EXPP_STAY3	0.032	0.000	0.000	0.243	0.000	0.000
EXPSQP_STAY3	0.010	0.000	0.000	0.074	0.000	0.000
EXPP_STAY4	0.023	0.000	0.000	0.000	0.279	0.000
EXPSQP_STAY4	0.008	0.000	0.000	0.000	0.091	0.000
EXPP_STAY5	0.026	0.000	0.000	0.000	0.000	0.228
EXPSQP_STAY5	0.007	0.000	0.000	0.000	0.000	0.065
GSCHOOL	0.086	0.119	0.028	0.020	0.017	0.028
GSPEAK1	0.051	0.000	0.150	0.202	0.146	0.085
GSPEAK2	0.688	1.000	0.100	0.065	0.071	0.144
GWRITE1	0.175	0.000	0.469	0.584	0.517	0.419
GWRITE2	0.670	1.000	0.044	0.025	0.034	0.068
MARRIED	0.790	0.751	0.769	0.897	0.918	0.800
CHILD	0.811	0.670	1.163	1.037	1.006	1.169
HEALTH	0.070	0.084	0.019	0.035	0.057	0.042
OCCSTAT1	0.330	0.169	0.656	0.701	0.645	0.551
OCCSTAT2	0.028	0.035	0.013	0.010	0.018	0.015

continued →

Table A1 continued

OCCSTAT3	0.162	0.235	0.006	0.011	0.013	0.041
OCCSTAT4	0.126	0.187	0.025	0.004	0.010	0.016
WCOND1	0.216	0.157	0.388	0.353	0.328	0.292
WCOND2	0.183	0.141	0.269	0.292	0.257	0.230
WCOND3	0.211	0.138	0.400	0.378	0.374	0.288
WCOND4	0.092	0.064	0.219	0.137	0.165	0.129
WCOND5	0.306	0.266	0.319	0.376	0.383	0.395
WCOND6	0.255	0.276	0.238	0.205	0.241	0.203
IND1	0.153	0.139	0.150	0.165	0.182	0.194
IND2	0.028	0.032	0.025	0.017	0.021	0.022
IND3	0.051	0.053	0.050	0.051	0.035	0.051
IND4	0.065	0.058	0.075	0.088	0.073	0.077
IND5	0.150	0.190	0.069	0.057	0.091	0.079
IND6	0.008	0.008	0.019	0.012	0.010	0.003
IND7	0.090	0.115	0.056	0.037	0.027	0.053
IND8	0.027	0.017	0.069	0.051	0.053	0.038
IND9	0.039	0.041	0.069	0.031	0.019	0.044
IND10	0.045	0.044	0.056	0.051	0.042	0.049
FSIZE1	0.279	0.270	0.281	0.301	0.279	0.302
FSIZE2	0.262	0.249	0.363	0.295	0.302	0.256
FSIZE3	0.312	0.328	0.169	0.274	0.327	0.275
EMPGR	0.781	0.740	0.364	0.803	0.993	0.891
URS	0.095	0.095	0.103	0.096	0.094	0.095
REG3	0.112	0.097	0.163	0.126	0.102	0.179
REG5	0.211	0.161	0.138	0.270	0.320	0.358
REG6	0.157	0.172	0.169	0.128	0.173	0.094
BOU1	0.182	0.168	0.219	0.216	0.221	0.188
BOU2	0.307	0.359	0.206	0.186	0.233	0.215

Table A2. Variable means - Remigration equation

Variable	Foreig.	< 14 Y.	15-26 Y.	27-44 Y.	Perman.
REM	0.013	0.034	0.019	0.010	0.005
EXPP	0.235	0.131	0.237	0.276	0.220
EXPSQP	0.068	0.026	0.068	0.086	0.061
UNEMPD	0.032	0.015	0.034	0.031	0.033
NATJ	0.190	0.067	0.188	0.165	0.228
NATG	0.139	0.063	0.129	0.235	0.092
NATI	0.213	0.236	0.161	0.202	0.276
NATS	0.123	0.048	0.099	0.173	0.127
SCHOOL	0.116	0.120	0.116	0.116	0.114
GSCHOOL	0.200	0.293	0.176	0.152	0.247
GTRAIN	0.148	0.231	0.114	0.130	0.186
HINC	0.014	0.016	0.014	0.013	0.014
AGE1	0.287	0.433	0.304	0.198	0.307
AGE2	0.450	0.149	0.455	0.543	0.423
AGE3	0.128	0.014	0.125	0.190	0.104
MARRIED	0.838	0.697	0.878	0.903	0.769
FMARRIED	0.054	0.072	0.072	0.060	0.026
HEALTH	0.071	0.038	0.051	0.099	0.081
GSPEAK1	0.159	0.154	0.223	0.152	0.089
GSPEAK2	0.099	0.139	0.067	0.073	0.149
GWRITE1	0.511	0.442	0.583	0.530	0.423
GWRITE2	0.049	0.087	0.028	0.038	0.076
FWRITE1	0.051	0.038	0.048	0.041	0.063
FWRITE2	0.436	0.476	0.457	0.430	0.410
FEMPGR	0.014	0.017	0.016	0.012	0.013
FUR	0.119	0.112	0.117	0.120	0.122
FGDPGR	0.032	0.045	0.036	0.029	0.029
FCPIGR	0.787	0.351	0.612	0.785	1.058
EMPGR	0.850	0.438	0.799	0.979	0.883

Table A3. Variable means - Employment equation

Variable	Overall	Germans	< 14 Y.	15-26 Y.	27-44 Y.	Perman.
EMP	0.781	0.756	0.755	0.838	0.851	0.830
EXPP	0.232	0.231	0.131	0.237	0.276	0.220
EXPSQP	0.069	0.070	0.026	0.068	0.086	0.061
UNEMPSP	0.403	0.395	0.288	0.430	0.317	0.501
UNEMPD	0.025	0.022	0.015	0.034	0.031	0.033
NATT	0.109	0.000	0.587	0.423	0.224	0.278
NATJ	0.061	0.000	0.067	0.188	0.165	0.228
NATG	0.045	0.000	0.063	0.129	0.235	0.092
NATI	0.069	0.000	0.236	0.161	0.202	0.276
NATS	0.040	0.000	0.048	0.099	0.173	0.127
SCHOOL	0.119	0.121	0.120	0.116	0.116	0.114
HINC	0.015	0.015	0.016	0.014	0.013	0.014
AGE1	0.310	0.322	0.433	0.304	0.198	0.307
AGE2	0.371	0.333	0.149	0.455	0.543	0.423
AGE3	0.161	0.177	0.014	0.125	0.190	0.104
MARRIED	0.731	0.679	0.697	0.878	0.903	0.769
CHILD	0.719	0.568	1.163	1.009	0.945	1.110
CHILD6	0.138	0.105	0.332	0.245	0.164	0.178
HEALTH	0.117	0.139	0.038	0.051	0.099	0.081
EMPGR	0.759	0.716	0.438	0.799	0.979	0.883
URS	0.095	0.095	0.102	0.096	0.094	0.095
REG1	0.054	0.061	0.014	0.046	0.049	0.026
REG2	0.102	0.120	0.043	0.074	0.066	0.057
REG3	0.108	0.098	0.163	0.125	0.093	0.156
REG4	0.076	0.091	0.053	0.045	0.066	0.032
REG5	0.201	0.153	0.144	0.260	0.308	0.363
REG6	0.153	0.167	0.135	0.120	0.171	0.096
REG7	0.031	0.032	0.038	0.036	0.018	0.028
BOU1	0.186	0.176	0.221	0.207	0.227	0.190
BOU2	0.315	0.368	0.197	0.188	0.225	0.211

Description of Variables in Tables A1 - A3: EARNINGS = real monthly gross earnings in DM; WTIME = normal working time per week; EXP = total labour market experience in years, divided by 100; EXPSQ = EXPsquared; STAY2 - STAY5 = total length of stay (see Table 2); GSCHOOL = years ofschooling, divided by 100, interacted with a dummy variable which takes on a valueof one if at least some schooling has been acquired in Germany; GSPEAK1 (GWRITE) = 1, no knowledge of oral (written) German; GSPEAK2 (GWRITE) = 1, good knowledge of oral(written) German; MARRIED = 1, married or spouse present in the household; CHILD = number of children in the household; HEALTH = 1, seriously disabled; OCCSTAT1 - OCCSTAT4 = dummies for occupational status; WCOND1 - WCOND2 = dummies for working conditions;IND1 - IND10 = industry dummies; FSIZE1 - FSIZE3 = firm size dummies; EMPGR = regionalemployment growth relative to previous interview; URS = seasonally adusted regional unemployment rate; REG1 - REG7 = regional dummies; BOU1 - BOU2 = dummies for urban agglomeration; REM = 1, if re-migrated (see text); NAT_j (j=T, J, G, I, S) = dummies for nationality (see Table 2); SCHOOL = total years of schooling; GTRAIN = 1, if at least some occupational training has been acquired in Germany; FMARRIED = 1, if wife is living in the home country; FEMGR = growth rate of employment in home country; FUR = unemployment rate in home country; FCPIGR = inflation rate in home country; EMP = 1, if employed (see text); UNEMPSP = number of unemployment spells in the ten-year period before1984; UNEMPD = cumulated duration of unemployment in that period; HINC = household income other than own income; AGE1 = between 26 and 39 years of age; AGE2 = between 40 and 54 years; AGE3 = above 55 years: CHILD6 = number of children under six years.

Source: German SOEP, waves 1 - 6, and OECD Main Economic Indicators.

Table A4. Maximum likelihhood estimation of re-migration equation for males, 1985–1989

Variable		Coeff.	t-value
CONSTANT		-0.38894	-0.32
EXPP		-1.69543	-0.42
EXPSQP		9.68205	1.45
UNEMPD		0.48623	0.84
NATY		-0.08749	-0.19
NATG		-0.35818	-0.77
NATI		-0.27138	-0.74
NATS		-0.09902	-0.11
SCHOOL		-6.91397	-1.58
GSCHOOL		-0.38218	-1.33
GTRAIN		-0.04612	-0.21
HINC		0.05376	0.01
AGE1		-0.20029	-0.53
AGE2		-0.77577	-1.41
AGE3		-0.65025	-1.01
MARRIED		-0.18510	-0.90
FMARRIED		0.76796	4.49
HEALTH		0.44709	2.61
GSPEAK1		0.23286	1.52
GSPEAK2		-1.16975	-2.22
GWRITE1		-0.12292	-0.84
GWRITE2		1.19155	2.35
FWRITE1		0.02735	0.11
FWRITE2		0.09185	0.73
FEMPGR		4.09497	0.64
FUR		-0.40628	-0.05
FGDPGR		-10.29770	-1.65
FCPIGR		-0.94253	-1.63
EMPGR		0.01314	0.35
LR statistic: χ^2 (28)	99.91		
McFadden's pseudo R^2	0.16		
# Observations	3821		
% Remigrated	1.54		
% Stayed	98.46		

Source: German SOEP, waves 2 - 6; own calculations.

Table A5. Maximum likelihhood estimation of employment equation for males, 1984-1989

Variable		Coeff.	t-value
CONSTANT		1.627	13.80
EXPP		3.440	3.93
EXPSQP		-11.471	-7.31
UNEMPSP		-0.027	-1.54
UNEMPD		-5.615	-10.90
UNEMPDSQ		2.131	1.81
NATT		0.067	1.24
NATJ		-0.104	-1.43
NATG		0.027	0.37
NATI		0.061	0.94
NATS		0.247	2.73
SCHOOL		-5.700	-8.02
HINC		-34.975	-35.04
AGE1		0.452	6.46
AGE2		0.706	5.80
AGE3		0.305	1.92
MARRIED		0.537	11.79
CHILD		-0.019	-1.02
CHILD6		-0.080	-1.39
HEALTH		-0.950	-22.05
EMPGR		0.008	0.61
URS		-0.112	-0.19
REG1		-0.026	-0.37
REG2		-0.248	-4.73
REG3		0.267	4.80
REG4		0.229	3.65
REG5		0.363	7.40
REG6		0.204	3.96
REG7		0.127	1.45
BOU1		-0.104	-2.47
BOU2		-0.102	-2.73
LR statistik: $\chi^2(30)$	5156.75		
McFadden's Pseudo R^2	0.35		
# Observations	13875		
% employed	78.1		
%non-employed	21.9		

Source: German SOEP, waves 1 - 6; own calculations.

Table A6. Earnings equations for males - fixed-effects model

	OLS estimates		IV estimates	
Variable	Coeff.	t-value	Coeff.	t-value
LAMBDA	0.0413	3.46	0.0408	3.18
RLAMBDA	-0.0012	-0.28	-0.0001	-0.02
LN_WTIME	4.6310	6.12	3.2663	3.81
LN_WTIMESQ	-0.5965	-5.95	-0.3516	-4.58
GSCHOOL	4.4330	2.77	4.4740	2.15
EXP	5.6120	20.02	6.0168	13.84
EXPSQ	-4.2010	-8.46	-4.4885	-8.63
EXP_STAY2	0.8029	1.35	0.9823	1.90
EXPSQ_STAY2	-2.0908	-1.37	-2.2045	-2.30
EXP_STAY3	0.6721	1.36	0.9873	2.01
EXPSQ_STAY3	-1.6027	-1.67	-2.2226	-2.45
EXP_STAY4	0.5903	1.21	0.9411	1.96
EXPSQ_STAY4	-1.3823	-1.45	-2.1119	-2.40
EXP_STAY5	0.8237	1.74	0.9686	2.02
EXPSQ_STAY5	-2.1940	-2.42	-2.2556	-2.57
GSPEAK1	-0.0004	-0.04	-0.0025	-0.27
GSPEAK2	0.0200	1.41	0.0184	1.31
GWRITE1	-0.0091	-1.17	-0.0092	-1.19
GWRITE2	-0.0010	-0.06	0.0004	0.02
MARRIED	0.0051	0.51	0.0044	0.41
CHILD	0.0019	0.59	0.0009	0.28
HEALTH	0.0087	0.65	0.0074	0.54
OCCSTAT1	-0.0132	-2.33	-0.0149	-2.59
OCCSTAT2	-0.0047	-0.38	-0.0115	-0.86
OCCSTAT3	0.0067	0.66	0.0041	0.38
OCCSTAT4	0.0561	4.89	0.0538	3.98
WCOND1	-0.0126	-2.08	-0.0124	-2.02
WCOND2	-0.0028	-0.53	-0.0030	-0.56
WCOND3	0.0286	3.22	0.0268	3.01
WCOND4	0.0039	0.43	0.0052	0.57
WCOND5	0.0099	1.90	0.0107	2.05
WCOND6	0.0098	2.03	0.0123	2.39
IND1	-0.1212	-2.53	-0.1132	-2.42
IND2	-0.0432	-1.31	-0.0495	-1.49
IND3	-0.0153	-0.94	-0.0161	-0.97
IND4	0.0376	1.53	0.0371	1.51
IND5	0.0483	2.41	0.0418	1.84
IND6	-0.0616	-2.10	-0.0565	-1.89

continued →

Table A6 continued:

IND7	-0.0502	-2.19	-0.0583	-2.32
IND8	-0.0375	-2.60	-0.0352	-2.41
IND9	-0.0272	-1.43	-0.0284	-1.16
IND10	-0.0266	-2.09	-0.0333	-2.44
FSIZE1	0.0461	3.37	0.0525	3.37
FSIZE2	0.0620	4.17	0.0697	4.45
FSIZE3	0.0878	5.44	0.0964	5.34
EMPGR	-0.0028	-2.58	-0.0018	-1.35
URS	0.0094	0.18	0.0092	0.17
REG3	0.0904	0.90	0.0913	0.90
REG5	0.0862	1.00	0.0864	1.01
REG6	0.1667	1.71	0.1668	1.75
BOU1	0.0199	0.52	0.0145	0.40
BOU2	-0.0382	-1.15	-0.0312	-0.94
T1	8.12 (2859, 7888)	8.68 (2859, 7888)		
T2	823.01 (52)	563.58 (52)		
R^2_{adj}	0.879	0.875		
# Observations	10800	10800		
# Individuals	2860	2860		
D.o.f.	7888	7885		

Note: t-values are based on heteroscedasticity-consistent standard errors (White, 1980). T1 tests the hypothesis that all individual effects are equal. The test statistic is F-distributed. T2 tests thenull hypothesis of homoscedeastic variances against an unspecified alternative (White, 1980). The test statistic has a χ^2 distribution; d.o.f. are in parentheses

Source: German SOEP, waves 1 - 6; own calculations.

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