

Labour market performance of immigrants in Germany revisited: The importance of omitted variable and attrition bias

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Abstract

We use longitudinal data over 21 years of the German Socio-Economic Panel to investigate the labour market performance of immigrants relative to comparable German natives. The contribution of this paper is twofold: First, we distinguish between four different immigration cohorts and ethnic Germans to control for the possibility of a change in 'quality' among immigrants. Both pooled and fixed-effects panel data specifications are considered, the latter to control for omitted variable bias. Second, we will account for selection bias caused by panel attrition, namely the decision to participate in the interview by both foreigners and German natives and the decision to stay in Germany by foreigners only, with selectivity correction terms calculated from uni- and bivariate reduced form probit models. In general, we find evidence for the assimilation hypothesis only for ethnic Germans and the youngest first generation cohort for average earnings. In contrast, we find a convex assimilation profile in unemployment probabilities only for ethnic Germans. These results are robust along a variety of model specifications and sample definitions. The speed of assimilation is over-estimated for average earnings and under-estimated for employment probabilities. Correcting for selection bias in the earnings equation decreases initial disadvantages of all foreigner subgroups relative to German natives, but also lowers the speed of assimilation. The net effect of sample selection adjustment is that catch-up with the average earnings of comparable German for the considered groups takes instead of 10 only 8 years.

Keywords: Panel data models, panel attrition, bivariate probit, labour market performance, first generation immigrants, ethnic Germans.

JEL Classification: C23, J15, J61, J62.

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1 Introduction

For many years now demographic change causes European societies to age, placing pay-as-you-go social security systems under considerable pressure. Against this background, it becomes increasingly well understood that a regulation of future immigration that is tailored to attract young and (economically) successful migrants can alleviate some of the demographic burden associated with an ageing population, although a major reform of these systems cannot be avoided. These considerations do hold particularly for those economies whose populations are ageing rapidly, with Germany being a leading example in this context.

Since the end of the Second World War Germany faces a multi-faceted immigration experience. In the period up to the 1970s immigrants to Germany were mainly low-skilled labor migrants from Southern Europe, driven by labor market opportunities in Germany and depressed conditions in the sending regions. Over the past three decades, the ethnic composition of immigration to Germany has changed, and the geographic and cultural gaps between Germany and the sending countries has presumably widened. Furthermore, Germany now has a sizeable community of second generation immigrants whose integration into German society is of growing concern.

Clearly, the extent to which a specific group is integrated into society has several non-exclusive dimensions with social inclusion being the broadest concept in this context. Social inclusion encompasses all aspects of societal participation necessary to provide a basis for a humane existence. Many observers fear that as migrant social inclusion becomes limited, the risk of increasing economic and cultural isolation rises, setting the stage for the creation of permanent second class citizens. On a pragmatic level social inclusion does not only imply equal economic opportunities but also the adequate participation of minorities in the process of political opinion and decision making, regular contacts between members of minority and majority groups, participation of minorities in cultural or leisure activities etc.. The existence of social exclusion might lead to the absence of a feeling of solidarity or identification with the society of the country of residence by minority groups. This in turn, may lead to a negative perception of minority groups by the majority and might end up in a self-enforcing downward spiral. The result might well be a segregated society, holding unfavourable economic prospects not only for its minorities.

Thus, economic integration is at least an important element – if not a prerequisite – of social inclusion. The economic prospects of immigrants are of vital concern, not only for the immigrants themselves but also for the destination country as a whole. Against this background, this paper provides a contribution to an informed discussion on the extent to which different immigrant groups currently living in Germany

perform well on the German labor market. Furthermore, we contribute to the existing literature by testing the assimilation hypothesis originally proposed by Chiswick (1978) using 21 waves of the GSOEP in an unbalanced panel analysis.

In our specification we will account for three possible sources of bias of the assimilation coefficient: First, we follow Borjas approach in allowing the quality of immigration cohorts to vary. This approach helps to detect whether a positive significant assimilation process captures only a secular decline of immigrant quality in terms of labour market potential. Thus, we distinguish between first generation immigrants arriving between 1955-1968, 1969-1973, 1974-1987, and 1988-2002 and ethnic Germans arriving between 1988 and 2002. Second, we consider fixed-effects estimation to control for the potential bias due to omitted variables such as ability. Third, the unbalanced panel under consideration suffers from considerable loss of observations over time. If the probability of leaving the sample prematurely, either due to item- or unit-non-response or, in the case of foreigners, due to return-migration is systematically linked with the labour market performance of each particular foreigner group, then the assimilation coefficient will be biased. We will control for these two sources of attrition bias separately for native Germans and foreigners with a Heckman selection procedure.

The remainder of the paper is structured as follows: In section 2 we will shortly review the theoretical literature, and the main empirical evidence on the labour market performance of immigrants in Germany. In section 3 we present some descriptive statistics from our chosen sample and introduce the different estimation strategies. We present and discuss the empirical evidence in section 4. We concentrate our exposition on the parameters of interest, in particular initial differences in labour market performance and the assimilation paths of the described immigrant groups compared to natives. To this end, we first estimate several specifications of the earnings equation in the framework of Pooled OLS (POLS), then we compare the assimilation coefficients with those obtained through a fixed-effects estimation, and ultimately correct these results for panel attrition and conduct a sensitivity analysis with regard to the sample definition. We repeat the same procedure for unemployment probabilities, except that we do not adjust for panel attrition. Section 5 summarizes and concludes.

2 Review of Literature

2.1 Theory

We base our analysis on the two seminal works of Chiswick (1978) and Borjas (1985). The former proposes the 'assimilation hypothesis' which states that immigrants, upon arrival, attract lower wages than comparable natives due to their difficulty of transferring human capital acquired in the sending country to the requirements of the host country. In due course of the years of residence in the host country immigrants experience an earnings-adjustment process for two reasons. First, according to the Human Capital Investment Theory (HCIT) (Dulep and Regets, 1999), immigrants have lower opportunity costs of acquiring new human capital, therefore they invest more in education than natives. In return, this additional human capital helps them to integrate better into local labour markets. Second, immigrants are positively self-selected (Chiswick, 1978). They dispose of individually unobserved characteristics such as work ethos, motivation or entrepreneurship that make their earnings-experience profiles steeper than the ones of comparable natives. According to Chiswick assimilation is a concave function of the duration of residence in the host country. To this end, he complements a standard Mincer equation by a quadratic term of 'years of residence' ($yrres_i$) and a dummy τ_i taking the value 1 if the individual is a foreigner. Thus, the log earnings ($\ln Y_i$) is modelled as:

$$\ln Y_i = \ln Y_0 + rS_i + C_1\tau_i + C_2(yrres_i) + C_3(yrres_i)^2 + u_i,$$

where Y_0 denotes a minimal earnings to which a respondent is entitled to if he has no education. Education is measured by years of completed schooling S_i and u_i is a normally distributed zero-mean error term. The assimilation profile due to Chiswick implies that $C_1 < 0$, $C_2 > 0$, and $C_3 < 0$.

For a cross-section in the US Chiswick finds the coefficient C_2 to be positive. A catch-up takes place after 10 to 15 years with the average income of a comparable native US citizen (Chiswick, 1978; Carliner, 1980).

Borjas (1985, 1995) alert that these estimates of the assimilation coefficient might be seriously biased due to two crucial assumptions invoked by a cross-sectional analysis: (1) The average quality of successive cohorts of immigrants is not changing over time, and (2) the incidence of return-migration is a pure random process. With respect to the former assumption, Borjas argues that a statistically significant estimate of assimilation is only a statistical artefact, because it captures the declining quality along immigrant cohorts. Those immigrants, who arrived the earliest in the sample were also those with the

highest unobserved productivity. So, their average earnings increased rapidly over time, not because they spent the longest period in the host country, but because they dispose of more favorable, unobservable traits which boost their wages. To test this hypothesis, Borjas constructs a decomposition from two cross-sections which allows to distinguish between within-cohort earning growth effects and between cohort effects both relative to comparable natives. The former computes the convergence of relative earnings within the same cohort within ten years, the latter computes the difference in relative earnings between two cohorts which are in the same position in their US life-cycle between 1970 and 1980. The main finding of Borjas (1985) is that convergence rates of 18 immigrant cohorts to the US are much lower than predicted by cross-section analysis, and that the overestimate of assimilation is up to 20 %. For some cohorts earnings growth has been very modest or even negative.

2.2 Empirical Evidence on Immigrant Performance in Germany

In general, there is a kind of consensus in the literature that first generation immigrants do not assimilate to German natives earnings dynamics over time. Furthermore, ethnic Germans who arrived in Germany in the three decades after the Second World War do not exhibit any initial disadvantages (Bauer, Dietz, Zimmermann, and Zwintz, 2005).

Nevertheless, a variety of papers in the German context support, at least to some extent, the assimilation hypothesis. All of the studies summarized here base their empirical analysis on either the German Socio-Economic Panel (GSOEP) or the German General Social Survey (ALLBUS). The older studies mainly investigate earnings dynamics of the guest-workers stemming from the five major sending countries Turkey, Yugoslavia, Italy, Greece, and Spain. The small number of more recent studies deals with a broader base of ethnic groups. One main conclusion of all these studies is that education differences play a major role in explaining initial earnings differentials.

Dustmann (1993) using GSOEP data concludes that assimilation patterns of immigrants strongly depend on the intended length of stay, which can be proxied by being a temporary or permanent immigrant. The longer an immigrant intends to stay in the host country, the more likely he is to invest into human capital formation and the better will be his earnings position. In a follow-up paper, Dustmann (1994) finds, using the same data set, that language abilities, especially writing proficiency, considerably improve the earnings position of migrants. Language ability, however, is self-assessed in the GSOEP and, thus, suspicious of being contaminated with severe measurement error.

Schmidt (1992) departs from variations in earnings dynamics of immigrants due to differences in their

countries of origin. The author finds for some ethnic groups initial disadvantages and substantial growth in earnings over time, but for other groups neither nor. Nevertheless, the study concludes that those groups which suffer the greatest initial earnings disadvantages are also those with the fastest earnings growth rates. In the framework of a theoretic contract model, Schmidt (1993) estimates the return propensities of immigrants and determines their impact on earnings growth. He finds that the average immigrant achieves earnings parity with the observationally equivalent native after about 17 years of residence. This study also associates lower initial return propensities with steeper earnings profiles.

Schmidt (1997) considers remaining earnings differences with comparable natives to be minor after controlling for educational attainment, labour market segment, and demographic differences. Using data on fully-employed men of two cross sections of the ALLBUS (1982, 1990) for ethnic Germans, and one cross section of the GSOEP (1984) for guest-worker immigrants, the paper concludes that there is little difference between ethnic Germans and comparable native Germans, no matter which specification is chosen, except for those ethnic Germans who arrived very recently. With respect to foreign guest-workers, most of their initial earnings differentials can be explained by differences in education levels, a result which is even stronger if occupational status and industry of employment is being accounted for.

A more recent contribution by Constant and Massey (2003) analyzes earnings and occupational prestige dynamics of foreign guest-workers and comparable natives. Utilizing 14 waves of the GSOEP the authors find that there is a widening prestige gap between natives and foreigners using the point system suggested by Ganzeboom, Graf, and Treiman. When considering monthly earnings, their results suggest that wages of immigrants increase over time at a faster rate than the ones of comparable natives, finding evidence for a catch-up after 23 years. Similarly as Schmidt (1997), the authors conclude that education policy is crucial to enable guest-workers economic assimilation given the large returns to higher education for immigrants.

The labour market performance of ethnic Germans is scrutinized by Bauer and Zimmermann (1997). Using the foreigner sample of the GSOEP, the authors investigate the earnings and unemployment dynamics of those ethnic Germans (Aussiedler), who entered Germany between 1984 and 1994. Further, they compare them to migrants from East Germany (Übersiedler). They also analyze whether there are substantial differences between immigrants from different sending countries. They do not find any initial earnings differentials of Eastern Europeans vis-à-vis comparable East Germans at the time of arrival. However, this study finds greater assimilation rates among Eastern Europeans compared to East Germans the longer they resided in West Germany. With respect to unemployment probabilities, ethnic

Germans from Poland and Russia face a smaller risk to become unemployed than East Germans or ethnic Germans from Romania.

Finally, two studies do not find any form of assimilation of foreigners living in Germany. Licht and Steiner (1994) use the first six waves of the GSOEP to model the effect of expected duration of stay of a foreigner on labour earnings. By accounting for selectivity bias of both return-migration and employment decision, endogeneity bias of hours worked, and different experience profiles for temporary versus permanent foreigners, the study concludes that there is no statistically significant assimilation process over years of experience in Germany despite an initial disadvantage for most foreigner groups vis-à-vis comparable natives. Only foreigners which intend to stay less than 14 years in Germany have lower initial earnings and a slightly steeper experience/earnings profile than natives. Pischke (1992), using also the first six waves of the GSOEP, finds no assimilation, but initial earnings are not significantly different between native and foreign blue collar workers.

3 Empirical Strategy

3.1 Choice of Foreigners' Subgroups

We justify the choice of our cohorts of first generation immigrants and ethnic Germans according to the legal changes in immigration policy in Germany since the 1950s. Immigration policy started with the 'guest-worker recruitment' to compensate the shortage of low-skilled labour in Germany. Italian workers accessed the country from 1955, Spanish and Greek from 1960, Turkish from 1961, Moroccan from 1963, Portuguese from 1964, Tunisian from 1965, and Yugoslavian workers from 1968 onwards. These were mainly low-skilled, male workers employed in industrial sectors. This originally temporary recruitment was halted in 1973 due to recessionary pressures caused by the first oil-price shock. Any immigration between 1973 and 1983 was restricted to family reunification, asylum seekers and refugees, citizens of other EU countries, ethnic Germans, and specialized labour such as scientists and international managers. Immigration inflows surged between 1988 and 1992 due to major political changes in Eastern Europe, the fall of the Iron Curtain, and the dissolution of Yugoslavia. This large wave constituted a great proportion of asylum seekers, which led ultimately to a more restrictive asylum law in 1993. However, special agreements have been signed to attract "Facharbeiter", these are skilled workers in specific sectors, mainly from Poland and the Czech Republic.

Immigration of ethnic Germans follows a different pattern. The majority of ethnic Germans entered

Germany after World War II, the so-called 'Frühaussiedler', but this inflow nearly ceased in the early 1950s. However, since 1988 a great number of ethnic Germans stemming from Eastern European countries, the so-called 'Spätaussiedler', arrived in Germany at a rate of about 200,000 per year until 1990. This soaring number caused the immigration law with reference to entry requirements for ethnic Germans to be changed again, which ultimately halved further inflows of ethnic Germans for the subsequent years.

To this end, we classify a first generation immigrant who entered during the first wave of guest worker recruitment between 1955 and 1968 as 'Cohort 5568'. An immigrant entering between the second guest worker recruitment wave between 1969 and 1973 is classified as 'Cohort 6973'. Those immigrants who entered during family reunification between 1974 and 1987 are classified as 'immic7487', and those who entered shortly before the fall of the Iron Curtain are classified as 'Cohort8802'. We chose ethnic Germans, 'Ethnic Germans', to be a homogeneous group stemming from Eastern Europe and Russia and arriving between 1988 and 2002. The sample is too small to subdivide this latter group any further.

3.2 Description of Data

We use all available 21 waves of the German Socio-Economic Panel (GSOEP) from 1984 to 2004. Our sample is selected according to the following criteria: (1) male persons aged between 18 and 60; (2) if raised in Germany, not grown up in East Germany; (3) no self-employed individuals, and (4) persons currently not in education or vocational training. This rule yields 86,510 person-year observations distributed over the 21 waves. Each sub-cohort of first generation immigrants are identified as being born outside Germany, entering Germany within a cohort-specific interval that lies between 1955 and 2002, and holding a foreign nationality. Ethnic Germans are identified as being born outside of Germany, holding a German citizenship, originating from Eastern Europe or Russia, and arriving in Germany after 1987. German natives are identified as being born and raised in West Germany and holding a German citizenship. In total, we dispose of 9,977 native Germans, 297 ethnic Germans, and 2,152 first generation immigrants. For the latter group we are left with 487, 749, 487, and 244 individuals for cohort 5586, 6973, 7487, and 8802, respectively.

Table 1 presents the means of basic socio-economic characteristics for all groups such as the the average age ('age'), the proportion of the group which stems from one of the five classic guest-worker countries for first generation immigrants or the proportion of individuals stemming from Romania, Poland, Russia and Kazhachstan for ethnic Germans ('nat/corigin'). We also report the age at entry to Germany ('age at entry') and the proportion of individuals that arrived at age younger than 15 (% < 15). Last, the

table shows the mean annual current gross labour earnings ('earnings')¹ and the proportion of each group being registered as unemployed ('unemp'). We can see that on average individuals from the first two immigration cohorts, Cohort 5568 and Cohort 6973, are the oldest, whereas Cohort 7487 and 8802 are the youngest individuals in the sample. German natives and ethnic Germans lie somewhere in the middle with an average age of 39 and 36 years, respectively. The majority of the first three generation cohorts stems from the classic guest worker countries Turkey, Ex-Yugoslavia, Greece, Italy, and Spain. Between 71 to 82 % of individuals in the first three cohorts originated from these countries. However, this nationality mix changed substantially for the last cohort Cohort 8802. From this cohort less than 50 % stem from these countries. This is also the group which arrived on average at a much older age (26 years) than the three previous cohorts (21, 22, 17 years respectively). Not surprisingly, annual real gross earnings are the largest for native Germans and second largest for Cohort 5568 and ethnic Germans².

Cohort 7487 is the group which arrived on average at youngest age in Germany. This is due to the fact that immigration during that time was made possible for reasons of family reunification. We must imagine members of this group to be those who moved along with their mother, parents, or other family members to Germany to live with a family member that arrived during the guest-worker recruitment era. Nearly 42 % of them arrived in Germany at age younger than 15 years of age. This is the group which, at least, partly, underwent the German education system. This group should show less problems of assimilation.

Some first evidence can be seen from the education indicators: From this cohort a much smaller proportion (14 %) dropped out of high school than from the two oldest cohorts (32 and 24 %). Ethnic Germans are relatively well educated, only 5 % dropped out of school and more than 4 % hold an upper high school degree. The youngest cohort of first generation immigrants is the group with the largest proportion of having obtained an upper degree, but it has also nearly 10 % of its sample that dropped out of school.

Relative to German natives a large proportion of most immigrant groups is registered as unemployed. The youngest first generation cohort is the one with the largest share of 15 %, whereas from the second oldest cohort 6973 less than 10 % are unemployed.

¹This variable reflects the sum of all monthly salaries before tax deduction. It comprises extra bonus payments such as 'Urlaubsgeld', i.e. holiday bonus, and the so-called 13th and 14th monthly salary. We chose yearly income, because it captures times of unemployment or underemployment. We could have used as well the generated variable monthly current gross labour income, which the interviewee claims to have received the month before the interview.

²We did not exclude outliers among ethnic Germans. There were only six individuals whose real gross earnings exceeded 100,000 Euro p.a.. Except for one individual, all hold a University degree and are older than 37 years of age. We excluded three cases from the German sample. Those were two individuals with less than 12.5 years of education and aged below 23 years, who earned more than 400,000 Euro p.a. and one technocrat aged 30 years who reported to earn more than 500,000 Euro p.a.

Table 1: Descriptive Statistics Disaggregated by Cohorts of First Generation and Ethnic Germans

Group:	age	corigin/nat	age at entry	% < 15	upper	dropout	earnings	% unemp
German	38.9	--	--	--	20.6	2.5	28,857	4.97
Cohort 5568	48.5	71.8	22.0	18.6	2.2	31.2	26,555	11.8
Cohort 6973	44.5	81.8	21.1	26.0	2.3	24.8	24,096	9.1
Cohort 7487	34.0	70.8	17.0	41.9	3.0	14.3	23,428	11.1
Cohort 8802	34.1	47.8	25.9	7.5	4.8	9.5	21,148	15.5
Ethnic Germans	36.4	91.9	27.8	15.9	4.4	5.1	25,205	11.2

The second column reports average age of the sample chosen, men between 18 and 60 years of age who are not in education anymore. The third column lists the proportion of each subgroup which stems from the original guest-worker countries Turkey, Ex-Yugoslavia, Italy, Greece, and Spain. For ethnic Germans we report the proportion of those individuals which stem from either Romania, Poland, Russia or Kazakhstan. 'Age at entry' in the fourth column refers to the average age of each subgroup at which individuals entered Germany. Column five reports the proportion of individuals which arrived in Germany younger than 15 years of age. Column six and seven report the proportion of each subgroup which holds an upper degree and who dropped out of school, respectively. 'Earnings' as reported in column eight are measured as the average annual gross labour income of each subgroup. Column nine reports the proportion of each subgroup being registered as unemployed. We use probability weights of being in the sample, $[pw = phrf]$, due to the over-sampling of foreigners.

Last, we display the evolution of raw income and unemployment differences over time for all foreigner subgroups relative to the German benchmark-case in Chart 5 and 6, respectively of Appendix II. Income differences over time are not really existent for the first three first generation immigrants as shown in graph 25. For the youngest immigrant group Cohort 8802 and ethnic Germans we see large initial disadvantages and a concave assimilation profile over time. The subsequent graphs show the raw income differences over time for each subgroup and the confidence intervals. Income differences are statistically significant for all five sub-groups relative to native Germans. They remain strictly negative for Cohort 7487, 8802 and ethnic Germans, and mainly positive for the oldest two cohorts 5568 and 6973. The latter implies that we cannot observe any concave assimilation profiles for these two groups. For unemployment probabilities we see that for all groups unemployment probabilities are statistically significant greater than for German natives and that these probabilities remain relative constant over time. Only for ethnic Germans and Cohort 8802 we see a slight downward trend over time.

3.3 Econometric Framework

To compare the labour market performance of the four cohorts of first generation immigrants and ethnic Germans relative to German natives we specify the following equation: Let Y_{it} be the logarithm of real annual gross earnings for individuals $i = 1, \dots, N$ and $t = 1, \dots, T_i$ (unbalanced panel), then we can

write the column vector $Y_i = [Y_{i1}, \dots, Y_{iT_i}]'$ to be a function of:

$$Y_i = Z_i' \alpha + Y_o R_i' \beta + X_i' \gamma + W_i' \delta + H_i' \phi + T D_i' \zeta + I_i' \eta + F_i' \tau + u_i. \quad (1)$$

The group specific dummy variables are captured by the $1 \times J_j$ row vector Z_i' , from which we drop German natives as the base group. $J_j = j(1 \times T_i)$ and $Z_i' = [d_{5568}, \dots, d_{8802}, d_{e88}]$ consists of j row vectors d_{ij}' which consist of $1 \times T_i$ of 1s if the individual belongs to a particular group j =[Cohort 5468, Cohort 6973, Cohort 7487, Cohort 8802, Ethnic Germans] and of 0s otherwise. The $j \times 1$ column vector $\alpha = [\alpha_{5568}, \dots, \alpha_{8802}, \alpha_{e88}]'$ measures the initial labour market differences between the particular immigrant group j and German natives. The $1 \times T_j$ row vector $Y_o R_i'$ measures the years an immigrant from each group j resided in Germany, $T_j = j(1 \times T_i)$ The $j \times 1$ column vector $\beta = [\beta_{5568}, \dots, \beta_{e88}]'$ represents the assimilation rates of each particular immigration group. Main focus of analysis in our paper are the two parameter vectors α and β . Given our intention to test the assimilation hypothesis as proposed by Chiswick (1978), we allow the functional form for 'YoR' to be quadratic despite all the caveats brought forward about the correctness of such a specification³. The $T_i \times k$ matrix X_i' represents a matrix of human capital dummy variable. It has k elements $x_{i,t}$ which take the value 1 if the individual holds a specific degree and vocational training k in time t and 0 otherwise. In our case k =[dropout, secondary, intermediate, upper, technical, no vocation, vocation, technocrat, university]=9, but we drop 'secondary' and 'vocation' as the base categories for schooling and vocational training. W_i' represents a matrix of dimension $T_i \times p$, where p = [age, persons living in household, marital status, disability status] = 4, and H_i' is a $T_i \times l$ matrix of work supply factors, where l = [weekly hours worked, tenure at same firm] = 2. $T D_i'$ stands for a $1 \times T_i$ row vector of time dummies to control for labour market conditions and other supply side factors. We drop the year $t=1991$ as the base category. I_i' is a $1 \times I_j$

³The critical reader will alert us. When looking at age-earnings or experience-earnings profiles it has been shown by Murphy (1990) and Yuengert (1994) that the quadratic form is not the appropriate functional form. According to the former, this specification understates early career earnings growth by about 30 to 50 %, and overstates mid-career growth by 20 to 50 %. According to the latter, it overstates relative earnings for both poorly and well-educated immigrants. The more appropriate specification would permit a cubic and a quartic term of experience. In addition, a quadratic functional form of years-since-migration will perform very badly in the presence of extreme outliers. To this end, we have scanned our sample for the extreme outlier cases. Using simply a linear specification of years-since-migration would, to our understanding, overstate earnings growth over duration of residence, even though it imposes less structure on the equation. Another solution would be to account for years-since-migration by a battery of dummy variables capturing different ranges of years-since-migration, e.g. 0 to 5, 6 to 10, and so on. This differences would then be accounted for by differences in average earnings (shift in the intercept), and earnings profiles would then be depicted across the years of experience. Since we are interested, however, in the earnings path of different cohorts, who implicitly reflect already these differences in years of residence, we refrain from this specification. In addition, we chose 'age' as the control for seniority rather than 'experience' for two reasons: First, we have no data on unemployment spells for all periods. Therefore, we don't capture true experience when simply calculating $\text{exper} = \text{age} - \text{yrsedu} - 6$. Beyond, foreigners from different countries face different compulsory school entry ages. Thus, choosing 6 as the age of school entry might be misleading. Second, we use the whole set of human capital controls, which might be highly correlated with the years of education variable.

row vector of 'age at entry into Germany', where $I_j = j(1 \times T_i)$ and each element in I_i consists of $1 \times T_i$ non-varying constants. This is the case because the age of immigration should be fixed no matter in which time-period the individual has been interviewed. Last, F_i' is a $T_i \times r$ matrix of regional dummies, where $r = [\text{Baden-Württemberg, Bavaria, Berlin-West, } \dots, \text{Schleswig-Holstein}] = 11$, but we drop North Rhine-Westphalia as the base category. Regional dummies account for living standard differences⁴. All other determinants of earnings that cannot be observed are aggregated in the normally distributed zero mean error column vector $u_i = [u_{i1}, \dots, u_{iT_i}]'$.

To be able to identify the effects of age, cohort dummies and period effects, we have to make one identifying restriction. This is the case because the years of residence is a linear combination of the period effect and the year of immigration.⁵ Therefore, we follow Borjas (1994) to assume the same period effects for all subgroups. This assumption is debatable, because we assume that macroeconomic developments such as business cycles will influence foreigners and natives in the very same way.

We will estimate equation (1) first by Pooled Ordinary Least Squares (POLS) to take advantage of the largest sample possible. This is particularly important when considering the small sample sizes of the sub-cohorts of first generation immigrants and ethnic Germans. Then, we will estimate equation (1) by a fixed-effects linear panel data specification to tackle potential 'omitted variable bias'. Individual effects can be purged from the estimating equation by subtracting the individual means from the raw observations as proposed in equation (2). In this transformation we sweep out the individual fixed-effects from the earnings equation by subtracting the mean of a variable z from each person-year observation:

$$\tilde{z}_{it} = z_{it} - \frac{1}{T} \sum_{t=1}^{T_i} z_{it}, \quad (2)$$

where z_{it} is any variable in equation (1). We are able to control, thus, for constant unobserved heterogeneity, such as ability, which might be highly correlated with our dependent variable. We will use White standard errors to adjust for inconsistent standard errors for this estimation, but also for the serial correlation present in the POLS estimation procedure⁶. Last, when estimating fixed-effects, we cannot include time-period dummies due to problems of perfect collinearity in the case of the co-presence of time-varying variables that vary every year by one unit (see Hsiao (2005, p.)).

⁴We include only West-German Länder dummies, because we have hardly any immigrants living in the Eastern parts of Germany in the sample.

⁵In our case years of residence can be expressed as: $yrres_{it} = 1984 - immiyear_{it} + 210d$, where d represents the period dummy. Substituting this expression into the specified regression equation, and allowing also for different periods effects for Germans and the various cohorts, we see that the system is not identified.

⁶When estimating clusters in POLS, we also adjust for the over-sampling of foreigners by applying probability weights as provided by the GSOEP

For the unemployment equation we specify a Pooled Probit model in a similar fashion as equation (1). Let $unemp_i^* = [unemp_{i,1}^*, \dots, unemp_{i,T_i}^*]'$. We interpret the elements $unemp_{it}^*$ to be the true underlying 'laziness' level which the individual disposes of, and it can be modelled as:

$$unemp_i^* = Z_i'\alpha + Y_oR_i'\beta + X_i'\gamma + W_i'\delta + T_i'\zeta + I_i\eta + F_i'\tau + u_i. \quad (3)$$

The vectors and matrices are the same as explained under equation (1), except for leaving out work related variables in H_i . The laziness level is not directly observable but it is related to a dummy variable which can take the values 0 for being employed and 1 for being unemployed. We observe the indicator variable $unemp_{it}$, which is an element in the $T_i \times 1$ column vector $unemp_i$ to be 1 if the true underlying laziness level of the individual is greater than a threshold level μ which we normalize to 0. More concrete, we assume that the individual i is observed to be unemployed if he is too lazy to search for a job:

$$unemp_i = \begin{cases} 1 & \text{if } unemp_i^* > 0 \\ 0 & \text{if } unemp_i^* \leq 0. \end{cases}$$

We assume the error terms to be standard normally distributed $u_i \sim N(0, 1)$. Hence, the probability to be unemployed can be expressed as:

$$Pr(unemp_i = 1) = \Phi(Z_i'\alpha + Y_oR_i'\beta + X_i'\gamma + W_i'\delta + TD_i'\zeta + I_i'\eta + F_i'\tau), \quad (4)$$

where Φ is the cumulative standard normal distribution function. This probability is used to construct the loglikelihood function. Parameter estimates are obtained by Maximum Likelihood. The fixed-effects specification follows a conditional logit fixed-effects model (Chamberlain, 1980) assuming a logistic distribution of the error term $u_i \sim \Lambda(0, \frac{\pi^2}{3})$.

3.4 Special Case: Panel Attrition

Since we use an unbalanced panel we cannot observe every individual in every year. Some individuals drop out for a multitude of reasons. One of the reasons of attrition is unit non-response, which means that an individual refuses to answer to a specific question or to participate at all in a particular year. The decision of non-participation refers to foreigners and natives alike. When we look at the foreigner groups alone, another reason for leaving the panel prematurely is the decision to return to one's home country. If these two decisions do not occur at random, which is the earnings determination process and

the return-migration or the non-participation process are not independent of each other, and if this is not adequately allowed for, biased and inconsistent parameter estimates of the earnings equation will result (Heckman, 1979).

We illustrate in Appendix III the evolution of the sample size disaggregated for each subgroup. Whether the the evolution of each subgroup is linked to the labour market performance can be illustrated by showing sample dynamics disaggregated for income quantiles (Chart3) and for four categories of professional training (Chart 4; none, apprenticeship, technical training, university degree). It is not obvious from these graphs whether in general members of the lowest income or education group have a higher probability to stay in the sample. However, it is clear the slopes for each income and education group differ substantially from each other. This is an a priori indicator for adjusting for panel attrition. A more formal test is the "Added-Variable Test" Verbeek and Nijman (1992).

One solution to attrition bias is applying a Heckman sample selection correction term (Hausman and Wise, 1979; Verbeek and Nijman, 1992). This approach is based on 'missingness on unobservables' (Fitzgerald, Gottschalk, and Moffit, 1998), which implies that there exists an unobserved variable that affects both the earnings equation and the attrition process⁷. We calculate sample selection correction terms separately for German natives and all foreigner subgroups. Regarding the participation decision, we can directly calculate the sample selection correction terms for German natives and ethnic Germans from a simple reduced form probit model. For the different cohorts of first generation immigrants, we have to calculate the terms from a bivariate probit model that links the error terms of the participation and non-return-migration decision.

To model the participation decision we regress a binary variable of 'partic'⁸ which takes the value 1 if the interview was not unsuccessful in that year and 0 otherwise, on a set of control variables which are lagged by one period, here indicated by the lag operator L. This is a reduced form probit estimation for the propensity to participate modelled analogous to the structure of the unemployment equation §).

$$partic_{i,j}^* = L.X'_{i,j,1}\beta_{j,1} + L.er'_{i,j,1}\gamma_{j,1} + \epsilon_{i,j,1}, \quad (5)$$

⁷There is ample evidence for the problems caused by this approach. Rendtel (2002, 1992) illustrates that the bias from using a bad instrumental variable might lead to an even higher bias than simply using OLS in the presence of panel attrition. Another way of controlling for attrition is 'missingness on observables', which would mean in our case labour market-related panel attrition. In this case the unobservables that influence panel attrition and the ones which influence labour market performance are uncorrelated (Behr, Bellgart, and Rendtel, 2003). We have not chosen this approach because we want to differentiate between different justifications of panel attrition such as participation refusal and return-migration.

⁸The codification of this variable is based on the variable 'success of interview' y1B126x, when it takes the value 1. This value represents "successful at the time".

where $partic_{i,j}^*$ is a $T_i \times 1$ column vector, and its T_i elements can be interpreted as the true, but unobserved net utility level of participation in the interview, $i = 1, \dots, N$, $j =$ German native (G), ethnic Germans (e88), $L.X'_{i,j,1}$ is a $T_i \times k$ matrix of explanatory variables lagged by one time period that may vary across the two groups, $\beta_{j,1}$ is a $k \times 1$ column vector of regression coefficients, and $\epsilon_{i,j,1}$ is a $T_i \times 1$ column vector. The 1 in the subscript of right-hand side (RHS) variables indicates the set of variables for the participation decision. In addition, $L.er'_{i,j,1} = [er_{i,j,1,1}, \dots, er_{i,j,1,T_i}]'$ is $1 \times T_i$ row vector of 'exclusion restrictions' also lagged by one time period for the identification of the sample selection correction, which has the property of influencing the probability to participate but not the earnings determination process. To be a valid and a good instrument, it must hold that $cov(L.er_{i,j,1}, u_i) = 0$ and $cov(L.er_{i,j,1}, partic_{i,j}) \neq 0$, whereas we can only test the latter assumption⁹. We will use in this paper an indicator for the 'change of interviewer during the first year since panel entry' equally for all groups j (Spiess and Pannenberg, 2003; Behr, 2004). The statistical significance and the magnitude of the coefficient scalar $\gamma_{j,1}$ serves as a criterion for the quality of the instrument. We observe the individual to participate in the interview, $partic_{i,j} = 1$, if the true, underlying net utility from participating is greater than a threshold value, which we normalize to be equal to 0:

$$partic_{j,it} = \begin{cases} 1 & \text{if } partic_{i,j}^* > 0 \\ 0 & \text{if } partic_{i,j}^* \leq 0. \end{cases}$$

Assume $\epsilon_{i,j,1} \sim N(0, 1)$ and let $L.X'_{i,s,1}\beta_{s,1} + L.er'_{i,s,1}\gamma_{s,1} = M_1$, $\theta_1 = [\beta_1 \ \gamma_1]'$, then the probability to participate can be expressed as:

$$Pr(partic_{i,j} = 1) = \Phi(M_1' \theta_1).$$

For German natives and ethnic Germans we can directly calculate the IMR from the estimated Pooled Probit model of this equation, namely:

$$\hat{\lambda}_{i,j,1}^{par} = \frac{\phi(M_1' \hat{\theta}_1)}{\Phi(M_1' \hat{\theta}_1)}, \quad (6)$$

where 'par' stands for participation decision.

For the first generation sub-cohorts we model the participation decision and the non-return-migration

⁹Usually the sample selection correction can be statistically identified from the nonlinearity of the reduced probit equation with its normally distributed error. However, in most economic context it is desirable to have a stronger identification strategy, i.e. exclusion restrictions based on economic theory (Schultz, 1993; Sartori, 2003).

decision jointly¹⁰. For the participation decision of first generation immigrants we can write:

$$partic_{i,s}^* = M_1' \theta_1 + \epsilon_{i,s,1}, \quad (7)$$

where $s = [\text{Cohort 5568, Cohort 6973, Cohort 7487, Cohort 8802}]$.

We interpret $nonmig_{s,it}^*$ to be the true, but unobservable net utility from staying in Germany. Let $L.X'_{i,s,2} \beta_{s,2} + L.er'_{i,s,2} \gamma_{s,2} = M_2$ and $\theta_2 = [\beta_2 \ \gamma_2]'$, then:

$$nonmig_{i,s}^* = M_2' \theta_2 + \epsilon_{i,s,2}, \quad (8)$$

where all explanations hold as above except for $L.er'_{i,s,2} = [er_{i,s,2,1}, \dots, er_{i,s,2,T_i}]'$ being the $1 \times T_i$ row vector of 'exclusion restrictions' lagged by one time period for the non-return-migration decision and 2 stands for the RHS variables of the non-return-migration decision. Exclusion restrictions may vary among the four sub-cohorts, so we choose either 'spouse' or 'children away', 'number of children below the age 13' or 'having left the country of origin due to war or seeking freedom'¹¹. In a similar fashion as for the participation decision, we observe a foreigner to be non-returning to his home country, if net utility from staying in Germany, $nonmig_{it}^*$, is greater than a threshold value, which we again normalize to zero:

$$nonmig_{i,s} = \begin{cases} 1 & \text{if } nonmig_{i,s}^* > 0 \\ 0 & \text{if } nonmig_{i,s}^* \leq 0, \end{cases}$$

assume $\epsilon_{i,s,2} \sim N(0,1)$ such that the probability to stay in Germany can be expressed as:

$$Pr(nonmig_{i,s} = 1) = \Phi(M_2' \theta_2).$$

We assume that the error terms of the two decisions are not independent from each other¹².

In the case of

$$cov(\epsilon_{i,s,1} \epsilon_{i,s,2}) = \rho_s \neq 0,$$

¹⁰The codification of non-return-migration is based on the variable 'success of interview' *yh3126x*, when this variable does not take the value 5, which represents "moving out of Germany". For ethnic Germans we do not have to formalize this decision, because we obtain only four person-year observations for this group in our sample.

¹¹The return-migration is usually considered to be influenced by various factors. These are among others relative deprivation, locational preferences, capital constraints, higher purchasing power in host or home country, higher rate of return to self-employment. Intentions to stay are used as well as variable to predict the migration duration (Dustmann, 2003).

¹²Let's assume the return migration decision is mainly driven by unobserved productivity considerations and the non-participation decision is also driven by this same factor. We could hypothesize this relationship to be negative, which means that the more productive workers are more likely to return home after they accumulated wealth, and that also the least productive workers are the more likely to refuse to answer in interviews.

we must calculate the IMRs for the four different cohorts of first generation immigrants from a bivariate probit model in which we account for partial observability according to Poirier (1980) and Vella (1998). We assume the error terms of the two equations (7) and (8) are distributed as bivariate normal and standardize variances to 1:

$$(\epsilon_{i,s,1}, \epsilon_{i,s,2}) \sim \text{bivariate normal}(0, 0, 1, 1, \rho_s),$$

and the loglikelihood (LogL) is

$$\text{LogL} = \sum \log \Phi(d_{i,s,1}M_1\theta_1, d_{i,s,2}M_2\theta_2, d_{i,s,1}d_{i,s,2}, \rho_s),$$

where $d_{i,s,l} = 2y_{i,s,l} - 1, l = 1, 2$. From this log-likelihood we can derive the bivariate probit Maximum Likelihood estimates $\hat{\theta}_1$ and $\hat{\theta}_2$ which we use to calculate IMRs according to Vella (1998, p. 256):

$$\hat{\lambda}_{i,s,1}^{bp} = \sigma_1 \cdot \frac{\phi(M_1'\hat{\theta}_1)\Phi(M_1(\hat{\theta}_2 - \hat{\rho} \cdot \hat{\theta}_1))}{\Phi^b(M_1'\hat{\theta}_1, M_2'\hat{\theta}_2, \rho)}, \quad (9)$$

and

$$\hat{\lambda}_{i,s,2}^{bp} = \sigma_1 \cdot \frac{\phi(M_2'\hat{\theta}_2)\Phi(M_2(\hat{\theta}_1 - \hat{\rho} \cdot \theta_2))}{\Phi^b(M_1'\hat{\theta}_1, M_2'\hat{\theta}_2, \rho)}, \quad (10)$$

The selectivity-corrected earnings equation can then be written:

$$Y_i = Z_i'\alpha + Y_oR_i'\beta + X_i'\gamma + W_i'\delta + T_i'\zeta + I_i'\eta + \sum_s \pi_j \hat{\lambda}_{i,s}^{par} + \sum_l \sum_j \pi_{j,l} \hat{\lambda}_{i,l,j}^{bp} + u_i, \quad (11)$$

where s stands for German native and ethnic German, 'par' means 'participation decision' and l stands for the participation (1) and non-return migration (2) of first generation cohorts and j stands for first generation cohorts.

4 Empirical Results

We report results only on the coefficients of interest, namely the 'foreigner specific intercept dummy' parameter vector α which represents the initial earnings differential between the particular foreigner group and the benchmark German native and the parameter matrix of 'years of residence' and its square β . In addition, we will only report results on the raw differences (model1), accounting for socio-economic

status, especially for the full set of human capital indicators (model 2), and for age at immigration and region (model 3). The non-reported coefficients for human capital yield the expected signs and magnitudes and they are all statistically significant. Full results are available upon request. We use for all pooled models cross-sectional probability weights as proposed by Spiess (2004) to account for the over-sampling of foreigners.

When analyzing the data we compare the different groups of immigrants to the average native reference individual in our sample: A male of 36.7 years old, married and lives in a 3.35 person household in North Rhine-Westphalia, who obtained a secondary high school degree (9 years of schooling) and completed an apprenticeship, who works 43 hours per week, who has been employed for approximately 11 years by the same firm, and who is being observed in the year 1991. We keep average earnings of this benchmark person constant over time, which translates into a horizontal earnings graph. We have decided for this option due to the difficulty posed by comparing Germans' versus immigrants' earnings profiles. Since we are using 'years of residence' as the varying variable, we must keep age or experience constant. However, for the German natives, we would have to use age or experience as the varying variable to get an idea of earnings dynamics. Therefore, we would have no other variable left to keep 'seniority' constant for both subgroups¹³. Thus, we would expect German natives earnings to grow with experience as well beyond the level which our average reference individual has achieved. We interpret catch-up rates of foreigners vis-à-vis comparable German natives, therefore, as the upper bound of possible catch-up rates.

4.1 Log Earnings

Table 2 reports the POLS results of the earnings equation for model 1 to 3 (Column 1-3) and their fixed-effects counterpart (Column 4-6).

¹³We demonstrate our point with the following question: 'Can we compare an immigrant who arrived at, let's say, age 20 and has working experience of 25 years, whose earnings increase over years of residence, with a German native whose earnings increase over each additional year of experience'?

Table 2: Results Log Earnings of POLS and FE, Different Model Specifications

	POLS RAW	POLS EDU	POLS PROV	FE RAW	FE EDU	FE PROV
	(1)	(2)	(3)	(4)	(5)	(6)
Cohort 5568	-.397 (.473)	-.025 (.486)	-.276 (.496)			
Cohort 6973	-.956*** (.214)	-1.004*** (.213)	-.584*** (.197)			
Cohort 7487	-.761** (.340)	-.050 (.186)	-.075 (.175)			
Cohort 8802	-1.436*** (.285)	-.667** (.274)	-.765*** (.275)			
Ethnic German	-1.043*** (.291)	-.886*** (.252)	-.981*** (.255)			
YrsRes C 5568	.011 (.035)	-.006 (.036)	.006 (.037)	.050*** (.017)	-.0009 (.013)	-.0009 (.013)
YrsRes C 6973	.063*** (.019)	.079*** (.019)	.031* (.018)	.071*** (.010)	.028*** (.008)	.028*** (.008)
YrsRes C 7487	.066* (.039)	.022 (.019)	.016 (.018)	.089*** (.008)	-.002 (.007)	-.002 (.007)
YrsRes C 8802	.202*** (.062)	.118** (.060)	.119** (.059)	.169*** (.023)	.116*** (.019)	.116*** (.019)
YrsRes Eth Ger	.092 (.057)	.152*** (.052)	.162*** (.055)	.141*** (.030)	.113*** (.024)	.113*** (.024)
YrsRes ² C 5568	.0002 (.0006)	.0003 (.0006)	.00008 (.0007)	-.0007** (.0003)	-.00002 (.0002)	-.00002 (.0002)
YrsRes ² C 6973	-.0007* (.0004)	-.001** (.0004)	-.0003 (.0004)	-.001*** (.0002)	-.0008*** (.0002)	-.0008*** (.0002)
YrsRes ² C 7487	-.002 (.001)	-.0007 (.0006)	-.0007 (.0005)	-.001*** (.0002)	-.0005** (.0002)	-.0005** (.0002)
YrsRes ² C 8802	-.008** (.003)	-.005* (.003)	-.005* (.003)	-.006*** (.001)	-.005*** (.001)	-.005*** (.001)
YrsRes ² Eth Ger	-.002 (.003)	-.006** (.003)	-.007** (.003)	-.004*** (.001)	-.005*** (.001)	-.005*** (.001)
Const.	10.099*** (.012)	6.277*** (.097)	6.323*** (.097)	9.879*** (.016)	6.145*** (.042)	6.145*** (.042)
Obs.	77879	67095	67095	77879	67095	67095
R ²	.035	.437	.441	.015	.282	.282
F statistic	58.651	173.708	160.969	99.832	794.709	794.709

Model 1 to 3 show POLS, model 4 to 6 linear Fixed-Effects results. Model 1 reports the raw differentials for the two different immigrant groups and their sub-cohorts vis-a-vis the German group; Model 2 controls for demographic factors such as marital status, number of children, the disability status as a proxy for health status and age and its square, the whole set of human capital formation, i.e. type of secondary education and type of vocational training, assuming that the return to education is the same for each additional degree for all three groups; Model 3, besides of controlling for those foreigners who arrived at age 15 or younger in Germany additionally controls for the 'Bundesländer', whereas regional dummies are restricted to West Germany; Model 4 to 6 represent the same models, respectively, except for being estimated with fixed-effects. Coefficients are semi-elasticities, i.e. they represent percentage changes in log earnings for a one unit change in the variable; White robust standard errors are reported in brackets. Coefficients are indicated to be significant at the 1% (*), 5% (**) level; N stands for number of person-year observations and R² for the goodness-of-fit summary measure. We use cross-section probability weights for individuals, [$pw = phrf$].

We seek to highlight three interesting findings: First, we find a statistically significant concave assimilation profile as suggested by Chiswick only for Cohort 6973, Cohort 8802 and ethnic Germans. The group specific intercept is negative for these groups, the coefficient on years of residence and its square are positive and negative, respectively. Once controlling for education (model2) Cohort 6973, Cohort 8802 and ethnic Germans achieve annual earnings nearly 100, 67, and 89 % respectively smaller than comparable German natives. These initial earnings differences would imply that these groups nearly receive no earnings at all upon arrival. These figures slightly increase again after controlling for age at immigration and region for ethnic Germans and Cohort 8802, but decrease by 50 % for Cohort 6973.

We find neither statistically significant initial earnings differences for Cohort 5568 and Cohort 7487 after controlling for education, nor statistically significant earnings' growth rates. We suggest different explanations for this phenomenon: Testing the hypothesis of concave assimilation profiles requires that we have data on initial earnings upon arrival of all immigrants, even from those who arrived in the 1950s through 1970s. Whereas we think that the initial earnings disadvantages represent earnings upon arrival for the three earliest groups, we, in reality just capture the earnings differences relative to Germans after a very long catch-up process somewhere between 1984 and 2004 that started somewhere between the 1950s and 1970s. Hence, we estimate earnings differences and dynamics close to the flattening of a concave earnings growth curve under the assumption that a concave assimilation profile also exists for these three earlier groups. This should be an explanation for the lacking assimilation profile for Cohort 5568. Why do we find then statistically significant results for Cohort 6973? The only explanation which crosses our mind is that this group differs substantially in unobserved characteristics from the first cohort. It is possible that we observe here a decline in quality of a cohort as suggested by Borjas. The group members belong to a second wave of guest workers stemming from the same countries as the members of cohort 5568. For this group we observe large earnings differences relative to comparable Germans even though its members have been living at least 11 years in Germany.

Why don't we find a statistically significant assimilation profile for cohort 7487 once we control for education even though we observe for at least some of its members earnings upon arrival? This is the group of immigrants which entered Germany during the family reunification period. A large majority of them arrived in Germany at a very young age. Nearly 40 % of them arrived at 16 years and younger, and 11 % even arrived at age younger than 6 years. Hence, a very large proportion of this cohort must have undergone the German schooling or professional training system, through which they had the opportunity to acquire more easily German language skills. Following Dustmann (1994) language skills are the major

determinant in labour market performance of foreigners in a host country. Hence, we could assume that this group of foreigners should not be expected to perform reasonably worse, given the same education level, as a comparable German native once we control for education.

Ethnic Germans do yield the second greatest and greatest initial disadvantages for model 2 and 3 and they also experience the steepest earnings growth rates of about 15 and 16 % per year. This could be explained by the fact that initial disadvantages for ethnic Germans from 1988 to 1993 are identified by a handful of individuals who perform particularly badly in the labour market. The assimilation profile is the second steepest for the youngest first generation Cohort 8802 in model 2 and 3. Every year this group experiences an annual earnings growth rate of nearly 12 %.

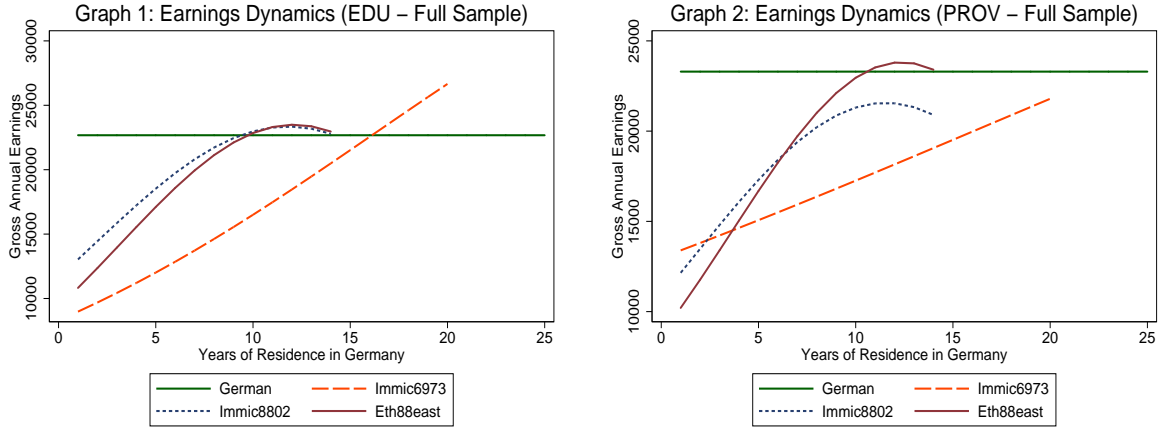
Initial earnings differences and assimilation rates seem to be relatively high given the received literature. They could be the result of an upward bias due to omitting unobservables such as 'ability' or 'productivity', which in our case should be positively correlated with 'years of residence'¹⁴. For this case we re-estimate the same models wiping out the fixed-effects as indicated in equation (2). The assimilation coefficient for Cohort 6973 reduces from 8 to less than 3 % percent points of annual earnings growth, so the earnings dynamics are reduced by more than 50 % in model (2). A similar drastic reduction in earnings growth can be observed for ethnic Germans. Assimilation profiles reduce from 15 to 11 % of annual growth rates, a reduction of about 40 %. Assimilation coefficients of Cohort 8802 reduce by a mere 0.2 % points. Overall, we can say that omitted relevant variables that are constant over time upward-biases the assimilation coefficient

Ultimately, we ask the question whether for the three immigrant groups Cohort 6973, 8802 and Ethnic Germans final catch-up with the German benchmark group takes place. Chart 1, graph 1 and 2, depicts assimilation profiles for model (2) and (3). When controlling for education, it takes Cohort 6973, 8802, and ethnic Germans about 16 and 9.5 years respectively to reach the income level of a comparable German native under the assumption that German natives' earnings remain constant (horizontal line). However, once controlling also for age at immigration and for regions in which the particular groups resides, only ethnic Germans still catch up, but by a year later. Cohort 6973 and 8802 no longer reach the average earnings level of German natives. Given that the benchmark earnings level has to be understood as the

¹⁴The sign of the bias of the estimator of 'years since migration' β depends on two parameters. These are the correlation coefficient between the omitted variable, let's say 'ability (a)' and 'years of residence (yrsres)' $\sigma_{a,yrsres}$ and the coefficient of ability when included as a regressor in the earnings equation, let's say γ_a . We may assume $\gamma_a > 0$ arguing that the more able foreigners will attract higher wages on average. Thus, the sign of the bias will depend on $\sigma_{a,yrsres}$. If we assume that the more able ones are also the ones who will remain in Germany, then $\sigma_{a,yrsres} > 0$. The bias is then calculated from the expected value of α as $E(\beta) = \hat{\alpha} + \hat{\gamma}_a \cdot \hat{\sigma}_{a,yrsres}$. If the more able ones are those who ultimately return to their mother country, then $\sigma_{a,yrsres} < 0$ is more appropriate to be assumed. In the latter case, omitting ability from the regression will downward bias the estimator on 'yrsres', in the former case we face an upward bias in the estimator of 'yrsres'.

smallest possible earnings level of German natives and given that assimilation rates are upward biased we can be rather sure that these two first generation cohort never fully catch up with comparable Germans. Why this is the case is beyond the scope of this paper.

Chart 1: Graphs 1 and 2 Show Earnings Dynamics of Foreigners Relative to Average German Native



4.2 Control for Panel Attrition and Sensitivity Analysis

It is possible that our results on assimilation profiles are also biased due to the presence of systematic, but unaccounted panel attrition. We test whether it is statistically necessary to account for panel attrition by the 'added-variable test'. It simply includes the 'number of waves the individual stayed in the sample' as additional regressors in the original earnings equation (1) (Verbeek and Nijman, 1992). If the coefficients of these additional regressors are statistically significant, some control for panel attrition should be considered. We find statistical significance for 'years in panel' for German natives, 'Cohort7487' and 'Ethnic Germans', but not for the other three subgroups. Given that this test is considered to have low power (Verbeek and Nijman, 1992), we will control for panel attrition for all six groups. The results of the 'added-variable test' are provided upon request.

Table 5 and 6 of Appendix II reports the results of the various reduced probit models. In order to avoid misspecification of the decision-equations we simply include the whole set of regressors which are included in the earnings equation. We do not seek to explain either the probability to migrate nor do we seek to explain the participation decision. Our chosen instruments are all statistically significant with the expected signs. From these probits we calculate the various IMRs according to equation (6) for ethnic Germans and German natives and to equation (9) and (10) for the first generation sub-cohorts.

In table 3 we present the sample selection corrected log earnings equations analogous to equation

(11) for model (2), the model that controls for the whole set of human capital. In addition, we conduct a sensitivity analysis with respect to our sample definition. We want to know whether our optimistic concave assimilation profiles are driven by those foreigners that underwent the German education system. For that reason, we re-estimate the benchmark model by restricting the sample to only those foreigners who arrived no younger than 15 years of age in Germany (column 3 and 4) or who have at least as many years of experience as they have lived in Germany (column 5 and 6). We report only the results for those immigrant groups, for which assimilation profiles turned out to be statistically significant.

Table 3: Results Adjusted Log Earnings for Model 2, Various Sample Definitions

	POLS S1	ADJPOLS S1	POLS S2	ADJPOLS S2	POLS S3	ADJPOLS S3
	(1)	(2)	(3)	(4)	(5)	(6)
IMR PAR German		.353*** (.014)		.352*** (.014)		.352*** (.014)
IMR PAR Eth Ger		.467*** (.077)		.376*** (.091)		.316*** (.091)
IMR PAR C 6973		.234*** (.024)		.097** (.048)		.109** (.050)
IMR PAR C 8802		.087 (.106)		.045 (.103)		-.035 (.091)
IMR NONMIG C 6973		-.440*** (.100)		-.059 (.104)		-.064 (.094)
IMR NONMIG C 8802		.536*** (.194)		.420* (.232)		.785*** (.162)
Cohort 6973	-1.004*** (.213)	-.116 (.172)	.043 (.189)	.326* (.198)	.026 (.196)	.315 (.202)
Cohort 8802	-.667** (.274)	-.616** (.275)	-.825*** (.288)	-.634** (.283)	-.807*** (.288)	-.703** (.280)
Ethnic German	-.886*** (.252)	-.728*** (.240)	-.930*** (.250)	-.707*** (.244)	-.941*** (.253)	-.717*** (.250)
YrsRes C 6973	.079*** (.019)	.008 (.016)	-.017 (.018)	-.028 (.021)	-.017 (.019)	-.030 (.021)
YrsRes C 8802	.118** (.060)	.102* (.059)	.143** (.063)	.119* (.062)	.123** (.062)	.116* (.061)
YrsRes Eth Ger	.152*** (.052)	.117** (.051)	.166*** (.053)	.131** (.053)	.172*** (.053)	.137** (.055)
YrsRes ² C 6973	-.001** (.0004)	.00004 (.0004)	.0006 (.0004)	.0008* (.0005)	.0006 (.0004)	.0009* (.0005)
YrsRes ² C 8802	-.005* (.003)	-.004 (.003)	-.006** (.003)	-.005 (.003)	-.005 (.003)	-.004 (.003)
YrsRes ² Eth Ger	-.006** (.003)	-.005* (.003)	-.007*** (.003)	-.006** (.003)	-.008*** (.003)	-.006** (.003)
Obs.	67095	67095	63177	63177	62268	62268
R ²	.437	.47	.43	.458	.431	.459
F statistic	173.708	167.796	154.174	137.701	152.796	137.669

Column number (1) and (2) report the unadjusted and adjusted earnings equation of model2 for the full sample (S1). Adjusted means that we included the various inverse Mills Ratios. Column number3 and 4 report the results for those foreigners who arrived in Germany aged 15 and older (S2). Columns number 5 and 6 report results for those foreigners who have not gained their first working experience in Germany (S3). White robust standard errors are reported in brackets. Coefficients are indicated to be significant at the 1 % (***) , 5 % (**) level; N stands for number of person-year observations and R^2 for the goodness-of-fit summary measure. We use cross-section probability weights for individuals, $[pw = phrf]$.

What is striking from the outset is that the inverse Mills ratios for the participation decision are statistically significant and positive in sign for all groups, except for Cohort8802. This implies that unobservables that influence the earnings determination process positively, are also having a positive impact on the willingness to participate in the interview. For all these groups, by not controlling for panel attrition, earnings levels are downward-biased, they should be higher. This result is stable across all three sample definitions.

With regard to the non-migration decision, unobservable factors which positively influence the labour market performance of Cohort 6973, have a negative impact on the decision to stay in Germany. For Cohort 8802 the opposite is the case. In plain words this means that the highly able members of Cohort 6973 are more likely return to their home country whereas the highly able members of Cohort8802 are those who are more likely to stay in Germany.

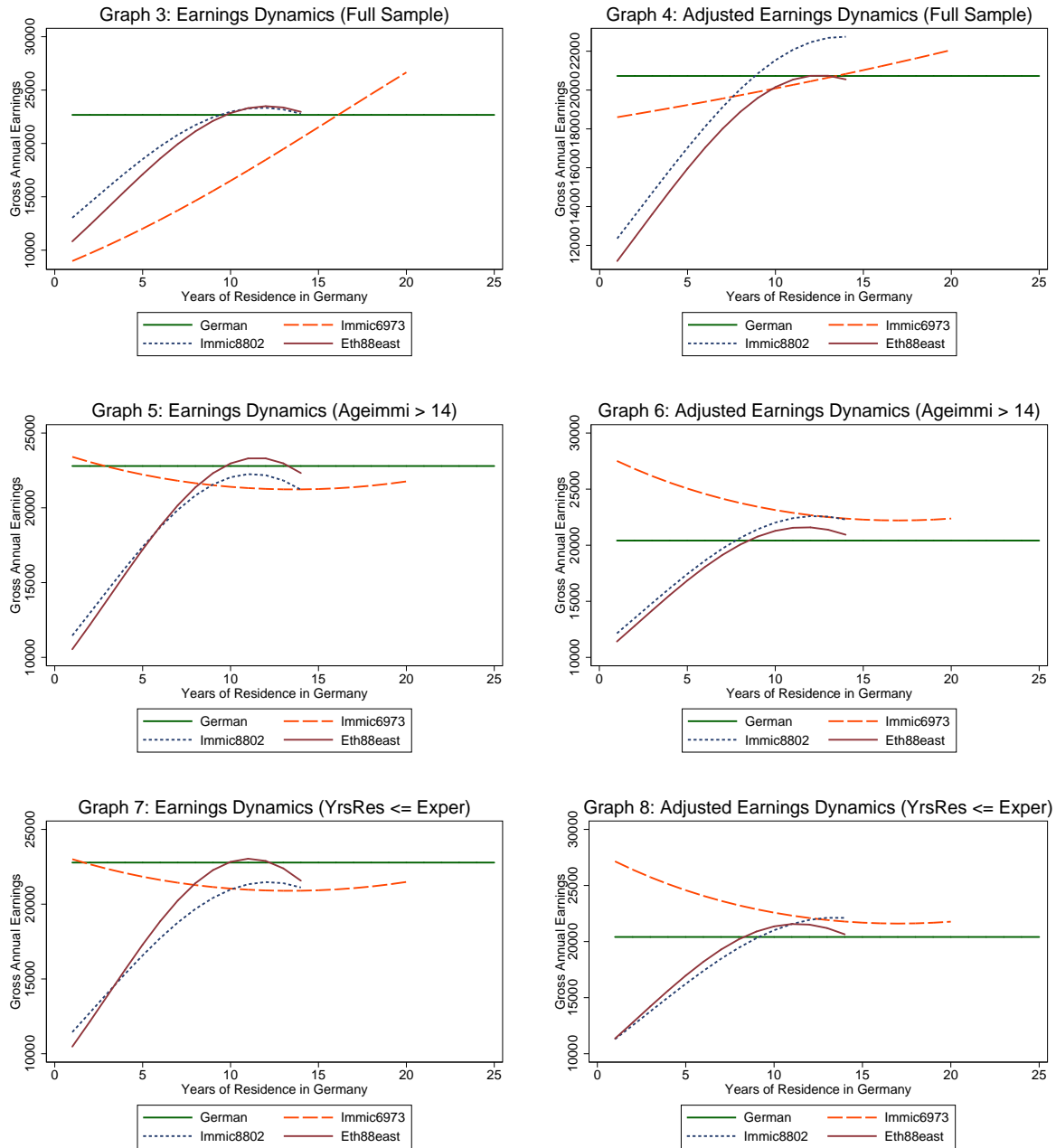
Do assimilation profiles change due to control for panel attrition? For Cohort6973 the differences are enormous. Initial earnings differences and assimilation rates are no longer statistically significant. In addition, for this group a concave assimilation profile no longer exists when considering only those foreigners who have no German labour market or schooling experience. Hence, for this group assimilation profiles depend strongly on control for panel attrition and on the definition of the sample.

Looking at the analysis for the full sample (columns (1) and (2)), after adjusting for panel attrition initial earnings differences are indeed smaller for Cohort 8802 and ethnic Germans relative to German natives by about 5 % and 14 % respectively. In addition, assimilation rates are also smaller for both groups by 1.6 and nearly 3.5 % respectively. These results are consistent in nature across the various sample definitions.

What does this imply for the final catch-up rates for ethnic Germans and Cohort8802? We can see from graph 3 and 4 that for Cohort 8802 catch-up with a comparable German native takes place by about 1.5 years earlier. Surprisingly, however, for ethnic Germans catch-up is delayed by about3 years. This could be explained by the fact that the benchmark earnings level of German natives is also pushed upwards while assimilation rates for ethnic Germans are substantially reduced. When applying the same analysis to the two restricted samples the analysis is slightly turned around. In both unadjusted models (graph 5 and 7) Cohort 8802 does not catch-up at all. In the adjusted model (graph6 vs. 8) this cohort

catches up even after 8 and 9 years of residence in Germany. Ethnic Germans also catch-up earlier after about 8 years.

Chart 2: Graphs 3-8 Show Adjusted & Unadjusted Earnings Dynamics of Model2



Graph 4 depicts model 2 using the full sample without adjusting for panel attrition. Graph 5 is the same model except for having included the different inverse Mills ratios calculated from the reduced form probits presented in table 4 and 5 in the Appendix. Graph 6 and 7 depict the adjusted and unadjusted specification of model 2 using a sample in which only those foreigners are included that arrived in Germany no younger than 15 years of age. Graphs 8 and 9 depict earnings dynamics of model 2 using a sample that includes only foreigners that have at least as many years of experience as they have resided in Germany. This excludes foreigners who spent some years in unemployment, school, remained out of the labour market for any other reason after having arrived in Germany.

4.3 Unemployment Probability

To complete the picture of the labour market performance of immigrants in Germany we will also compare the different propensities to be unemployed for all five subgroups relative to the one of German natives. In table 4 we report the marginal effects for raw unemployment differentials(1), for human capital (2), and age at immigration and regions (3). The human capital coefficients are not reported, however, they turn out significant and with the right sign: An individual with an 'upper degree' has the smallest probability of being unemployed, whereas someone with 'another degree' or 'dropout' has the highest probability. Similarly, an individual with a 'university degree' has the smallest probability whereas someone with 'no training' has the highest probability to be unemployed. These results are available upon request. Column 4 to 6 reports the marginal effects for the assimilation rates estimated with a fixed-effects specification in which we control for omitted variables.

Eye-balling the results in table 4, we find again only for the most recent cohort of immigrants Cohort 8802 and ethnic Germans a statistically significant higher initial probability to be unemployed than a comparable German native when controlling for education (column 2). An immigrant stemming from the Cohort 8802 cohort faces a 8 % higher probability to be unemployed upon arrival, whereas an ethnic German is even by 33 more likely to be unemployed.

When looking at assimilation rates, we find only for ethnic Germans a statistically significant convex assimilation profile. For each additional 'year of residence', the unemployment probability falls by 1.5 %. This figure remains surprisingly robust along all three model specifications. For this group assimilation rates double once we control for omitted variables (columns (4) to (6)). However, we have to alert: We loose in the sample of the fixed-effects estimation nearly 60,000 person-year observations, i.e. two-thirds of our sample and we investigate here only those individuals which have been unemployed at least once. Thus, results should be interpreted with great care, because this subsample could be systematically different from the sub-sample. We estimate the marginal effects by setting the individual fixed effect equal to zero¹⁵.

¹⁵The marginal effects are tricky to calculate in STATA. Using the conventional 'mfx compute, p' command is not allowed for 'xtlogit, fe'. We follow the advice from other STATA users to use the 'mfx compute, predict(pu0)' command. This command calculates the probability of being unemployed, given that the fixed-effect is zero: $y = \text{Pr}(\text{unemp}|\text{fixed effect is } 0)$ (predict, pu0).

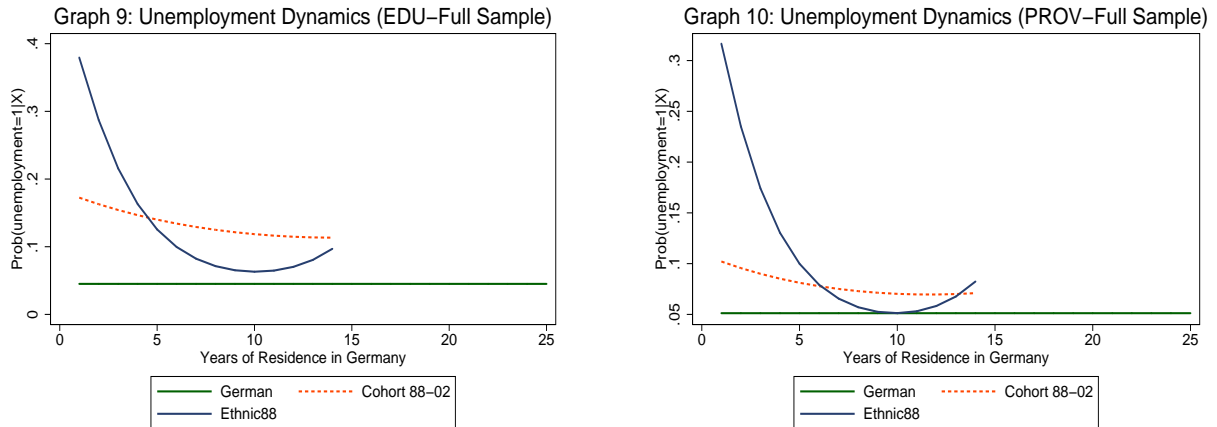
Table 4: Results Unemployment Probabilities of PP and CLFE, Different Model Specifications

	PPROB RAW	PPROB EDU	PPROB PROV	FE RAW	FE EDU	FE PROV
	(1)	(2)	(3)	(4)	(5)	(6)
Cohort 5568	0.0454 (0.1899)	0.1504 (0.3344)	0.1450 (0.3275)			
Cohort 6973	0.9926*** (0.0239)	0.0312 (0.0600)	-0.0241 (0.0230)			
Cohort 7487	0.0791 (0.1162)	0.1164 (0.1816)	0.0624 (0.1042)			
Cohort 8802	0.1202** (0.0755)	0.0842** (0.0687)	0.0271 (0.0453)			
Ethnic German	0.3464*** (0.1379)	0.3301*** (0.1586)	0.2303*** (0.1703)			
YrsRes C 5568	-0.0002 (0.0072)	-0.0031 (0.0048)	-0.0038 (0.0042)	-0.0154 (0.0306)	-0.0049 (0.0068)	-0.0051 (0.0074)
YrsRes C 6973	-0.0407*** (0.0099)	-0.0025 (0.0035)	-0.0012 (0.0030)	-0.0336 (0.0205)	-0.0106* (0.0059)	-0.0115* (0.0067)
YrsRes C 7487	-0.0031 (0.0058)	-0.0046 (0.0045)	-0.0035 (0.0037)	-0.0033 (0.0127)	0.0027 (0.0035)	0.0027 (0.0037)
YrsRes C 8802	-0.0036 (0.0065)	-0.0021 (0.0047)	-0.0019 (0.0040)	-0.0432 (0.0280)	-0.0038 (0.0072)	-0.0029 (0.0077)
YrsRes Eth Ger	-0.0193*** (0.0074)	-0.0149*** (0.0051)	-0.0128*** (0.0047)	-0.0934*** (0.0360)	-0.0262* (0.0136)	-0.0267* (0.0151)
YrsRes ² C 5568	0.0000 (0.0001)	0.0000 (0.0001)	0.0001 (0.0001)	0.0011** (0.0005)	0.0002 (0.0001)	0.0002 (0.0001)
YrsRes ² C 6973	0.0008*** (0.0002)	0.0001 (0.0001)	0.0000 (0.0001)	0.0016*** (0.0004)	0.0003** (0.0001)	0.0003* (0.0002)
YrsRes ² C 7487	0.0001 (0.0002)	0.0001 (0.0001)	0.0001 (0.0001)	0.0005 (0.0004)	0.0001 (0.0001)	0.0001 (0.0001)
YrsRes ² C 8802	0.0002 (0.0004)	0.0001 (0.0003)	0.0001 (0.0002)	0.0014 (0.0016)	-0.0002 (0.0004)	-0.0002 (0.0005)
YrsRes ² Eth Ger	0.0009*** (0.0004)	0.0007*** (0.0003)	0.0006*** (0.0002)	0.0055*** (0.0019)	0.0014* (0.0007)	0.0014* (0.0008)
N	85227	83412	82456	22482	21818	21403

Model (1) to (3) reports the Pooled Probit specifications, whereas models (4) to (6) represent the Fixed-Effects equivalents. Model 1 reports the raw differentials for the two different immigrant groups and their sub-cohorts vis-à-vis the German group. Model 2 controls for demographic factors, age and its square and the whole set of human capital formation, i.e. type of secondary education and type of vocational training, assuming that the return to education is the same for each additional degree for all three groups. Model 3 controls further for immigrant specific variables such as age at immigration and additionally controls for regional dummies, which represent the 'Länder'. Coefficients are marginal effects, i.e. they represent percentage changes in the probability of being unemployed, if the individual would change status from one group to another; White robust standard errors are reported in brackets. Coefficients are indicated to be significant at the 1 % (***) level; N stands for number of person-year observations and Pseudo R^2 for the goodness-of-fit summary measure.

By graphing the assimilation profile for ethnic Germans we see that members of this group catch-up with comparable German natives at least after 9.5 years of residence after controlling for the full set of variables, i.e. also for age at immigration.

Chart 3: Graphs 9 and 10 Show Unemployment Dynamics of Foreigners Relative to Average German Native



We will not control for the potential of attrition bias, since nonlinear models require an 'inverse probability weighting' scheme, which is different in nature from the sample selection procedure. However, we know from the analysis of average earnings that assimilation profiles are most likely downward-biased. The speed of assimilation should be faster by about two years.

Last, it should be mentioned that our results on unemployment probabilities reinforce the results of earnings assimilation for ethnic Germans only. These tend to have lower wages and higher unemployment probabilities upon arrival, whereas they catch-up with comparable Germans after approximately 10 years in model (3). The youngest cohort of first generation also suffers from initial earnings and unemployment differences, but they continue to have difficulties in finding employment even after controlling for the full set of education variables.

5 Conclusion and Outlook

How can we evaluate our results? First, it must be stressed that labour market performance of all foreigner groups in Germany is not so bad after all. Second, omitted variable and attrition bias do play a quantitative role, but don't change the nature of our main results. Third, our data is not rich enough to say anything substantial about the assimilation behaviour of the earliest immigration cohorts.

With respect to annual earnings, ethnic Germans and the youngest cohort of first generation immigrants, Cohort 8802 clearly show a statistically significant concave assimilation profile as predicted by Chiswick. This finding is not changed in nature when controlling for omitted variable and attrition bias. The former upward-biases the assimilation coefficient, but controlling for it through fixed-effects

estimation does not make its existence disappear.

Panel attrition turns out to be a significant factor in our analysis. For most foreigner sub-groups and German natives unobservable factors, let's say 'ability', are positively linked to those unobservable factors that influence the decision to participate in the interview. Hence, for all subgroups those individuals will remain in the sample who perform relatively well in the labour market. This means that average earnings of each subgroup should be higher than estimated, even for the German native benchmark group. Controlling for that bias average earnings differences relative to German natives are less pronounced, but also assimilation profiles are less steep for ethnic Germans and Cohort 8802. The overall effect is that catch-up with the comparable German native after controlling for the whole set of socio-economic variables, takes place approximately two years earlier both for the full and the restricted samples. One sole exception is the group of ethnic Germans in the full sample.

One interesting aspect needs special mention: The second oldest cohort 6973 faces an assimilation profile similar to that of the other two significant groups. Once adjusting however, for panel attrition and/or for the sample definition, neither initial differences nor the assimilation path is statistically significant.

We need to stress the problem that we do not observe initial earnings differences for all three oldest cohorts. They arrived in Germany between 1955 and 1987, we observe however, earnings for all these groups only from 1984 onwards. This is to say that we observe these groups in the middle of their assimilation process, when assuming that they experienced initial earnings disadvantages and given they show a concave assimilation profile over time.

Despite the positive findings for earnings differences, we cannot say the same for unemployment probabilities. We find only for ethnic Germans a statistically significant convex assimilation profile and catch-up takes place only after controlling for the full set of education, age at immigration and regional dummies. After about 8 years upon arrival, ethnic Germans face the same probability to be unemployed as a comparable German native. A member of Cohort 8802 faces a slightly smaller risk to be unemployed upon arrival than an ethnic German, however, this risk doesn't subside over time. In contrast to earnings dynamics, omitted variables downward bias the speed of assimilation for ethnic Germans.

What policy recommendations may be deduced from our results? In a nutshell we can state that ethnic Germans arriving in Germany after 1988 do face some difficulties entering the labor market, but they are able to overcome these hurdles relatively quickly after about 7-8 years. Immigrants from the youngest cohort perform reasonably well, if they find a job, but do have troubles of getting employed at all when compared to an equivalent German native. More research needs to be conducted to find out for which

reasons this is the case, because education differences cannot explain this phenomenon. Last, we cannot judge too much about the first three cohorts. They seem to yield no statistically significant differences, when comparing equals with equals. Last, education differences play a major role in explaining earnings differences between foreigners and German natives. Most foreigners in Germany simply have obtained very little education and professional training. Hence, we go along with Schmidt (1997) and Constant and Massey (2003) that education policy towards immigrants is crucial to foster the assimilation process in Germany. A next step in our research will be to scrutinize systematically the labour market performance of the children of immigrants to Germany. This is to get an idea whether the low skilled nature of parents is being passed on to their children.

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Appendix I: Results of Participation and Non-Migration Decisions

Table 5: Results of Reduced Probit for Participation Decision

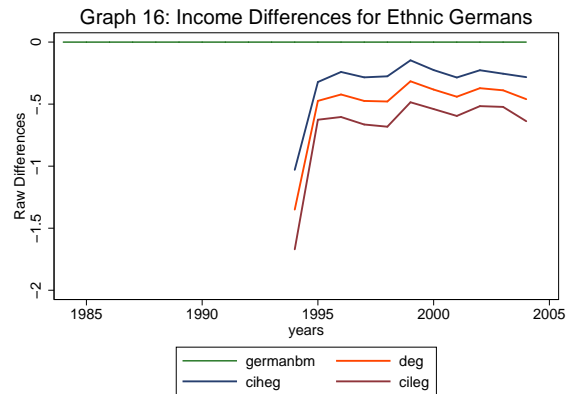
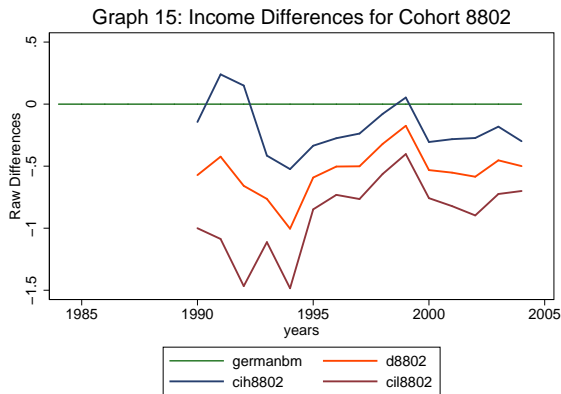
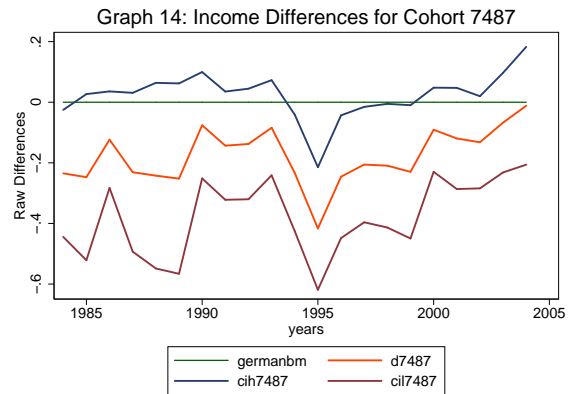
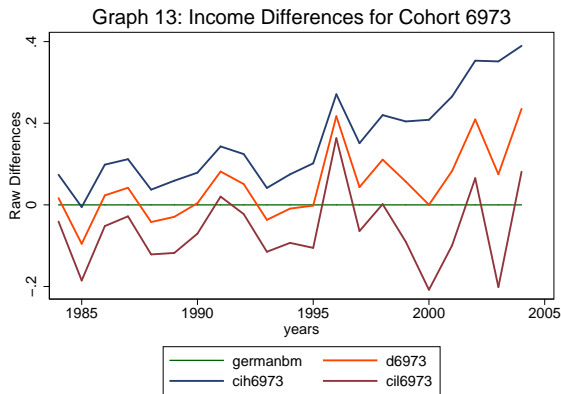
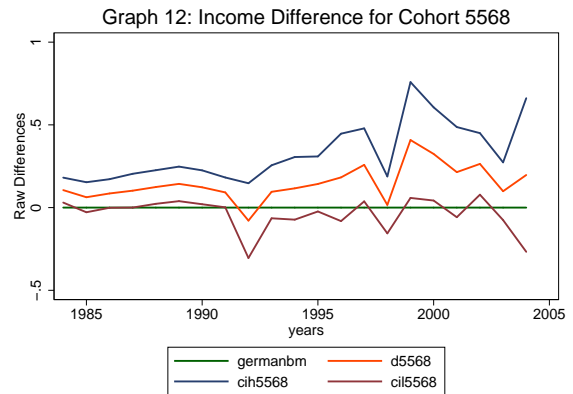
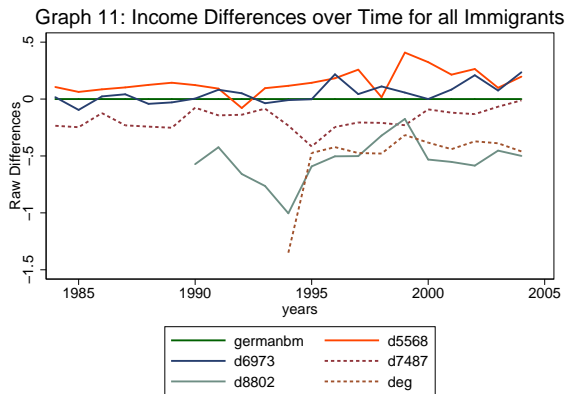
	GER	C 5568	C 6973	C 7487	C 8802	Eth Ger
	(1)	(2)	(3)	(4)	(5)	(6)
Change of Interviewer (IV)	-.412*** (.020)	-.554*** (.215)	-.545*** (.117)	-.483*** (.088)	-.840*** (.107)	-.541*** (.184)
Age	-.002 (.006)	-.057 (.043)	-.022 (.054)	.232*** (.045)	-.037 (.034)	.068 (.054)
Age ²	.0001* (.00007)	.0006 (.0005)	.0007 (.0006)	-.002*** (.0005)	.0007 (.0005)	-.0006 (.0007)
Workhrs (p.W.)	-.003*** (.0009)	-.005 (.007)	-.012*** (.005)	.022*** (.004)	.007 (.005)	-.001 (.006)
Tenure in firm (Yrs.)	.003** (.001)	.024 (.016)	.015*** (.005)	.009* (.005)	.011 (.009)	.010 (.021)
Intermediate (10 Yrs.)	.009 (.021)	.230 (.165)	-3.121*** (.301)	1.301*** (.308)	.105 (.155)	-.026 (.349)
Technical (10 to 12 Yrs.)	.075** (.037)	-.380 (.346)		-.259 (.276)	-.657** (.317)	
Upper (13 Yrs.)	.160*** (.032)	-.278 (.232)	-.691* (.354)	.700*** (.253)	.746*** (.204)	-.139 (.385)
Other	.017 (.093)	.391*** (.134)	-.170 (.189)	.591*** (.166)	-.082 (.103)	-.234 (.241)
Dropout	.122* (.069)	.639 (.501)	.383** (.184)	.541*** (.166)	-.348*** (.124)	-.010 (.324)
University Degree	-.164*** (.032)	.356** (.164)	-.802** (.323)	-.0003 (.190)	-.590*** (.172)	-.319 (.246)
No Prof. Training	-.099*** (.030)	-.018 (.145)	-.768*** (.178)	.333** (.153)	-.074 (.099)	-.315 (.220)
Technocrat Training	-.069*** (.021)	-.019 (.131)	-.557*** (.192)	.322** (.154)	.019 (.143)	.006 (.236)
Separated	-.117 (.073)	-.930* (.490)	.781** (.355)	-.089 (.242)	-.021 (.326)	-1.413*** (.413)
Single	-.091*** (.025)	-.047 (.176)	1.410*** (.191)	2.094*** (.242)	-.078 (.113)	-.653*** (.223)
Divorced	-.144*** (.037)	-1.260*** (.310)	.273 (.182)	1.107*** (.219)	-.234 (.172)	-.982*** (.284)
Person in HH (No.)	.040*** (.007)	.026 (.025)	.135*** (.030)	.267*** (.030)	.101*** (.021)	.192*** (.051)
Const.	-.051 (.126)	1.362 (.835)	-.345 (1.198)	-9.650*** (1.190)	-.125 (.619)	-1.227 (1.004)
Obs.	44865	1162	2869	5304	3007	855

Table 6: Results of Reduced Probit for Non-Migration Decision

	C 5568	C 6973	C 7487	C 8802
	(1)	(2)	(3)	(4)
No. Child. < 13 (IV)	.246*** (.063)			
Child Away (IV)		.548*** (.180)		
Spouse Away (IV)			-1.029** (.440)	
War or Freedom (IV)				.450* (.271)
Age	.359*** (.047)	.088** (.035)	-.061 (.043)	-.083 (.071)
Age ²	-.004*** (.0005)	-.001*** (.0004)	.001* (.0006)	.001 (.0009)
Workhrs (p.W.)	.006 (.004)	.003 (.005)	-.009 (.007)	-.014* (.008)
Tenure in firm (Yrs.)	.019*** (.005)	.015** (.006)	.023*** (.009)	-.063** (.030)
Intermediate (10 Yrs.)	.842** (.338)	-.053 (.238)	4.909*** (.166)	4.934*** (.178)
Technical (10 to 12 Yrs.)		4.799*** (.221)	-1.227*** (.297)	
Upper (13 Yrs.)	.031 (.388)	4.667*** (.213)	.101 (.261)	-1.517*** (.377)
Other	-.792*** (.148)	-.868*** (.199)	-.975*** (.124)	-.565*** (.213)
Dropout	-1.046*** (.167)	-.729*** (.203)	-1.120*** (.161)	-1.161*** (.373)
University Degree	-.263 (.271)	-.398 (.257)	.132 (.215)	-.201 (.280)
No Prof. Training	-.546*** (.142)	-1.020*** (.211)	.521*** (.150)	-.155 (.281)
Technocrat Training	-.474*** (.154)	-.977*** (.216)	.420*** (.138)	-.595** (.267)
Separated	1.072*** (.287)	-.420 (.370)	-.453 (.336)	6.321*** (.255)
Single	.430*** (.157)	-.138 (.206)	.631*** (.133)	-.324 (.264)
Divorced	.959*** (.225)	-.045 (.223)	1.198*** (.231)	6.671*** (.403)
Person in HH (No.)	.036 (.039)	.119*** (.037)	.211*** (.036)	-.035 (.061)
Const.	-6.134*** (1.060)	1.137 (.871)	2.210*** (.837)	4.174*** (1.304)
Obs.	2869	5304	3007	855

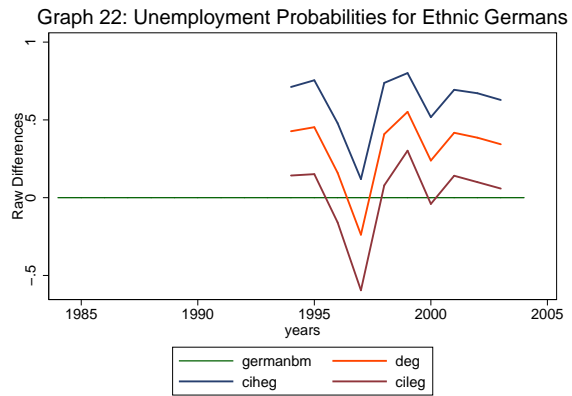
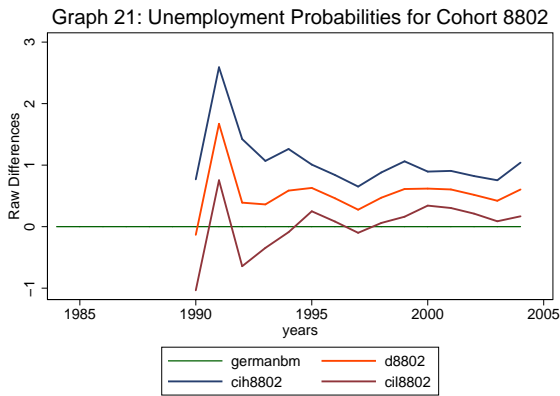
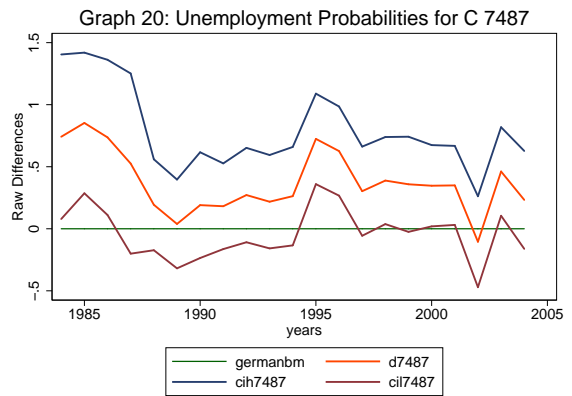
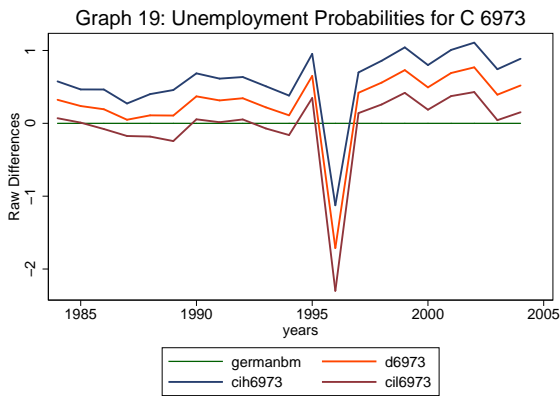
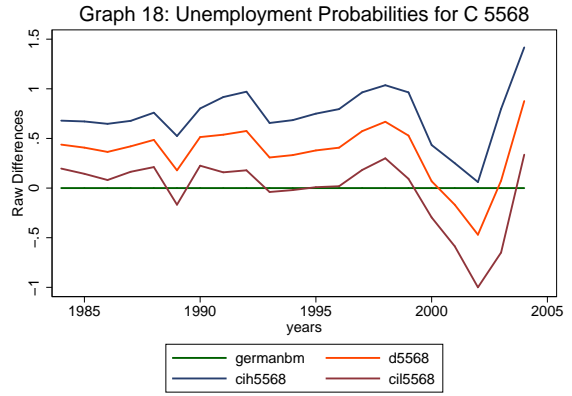
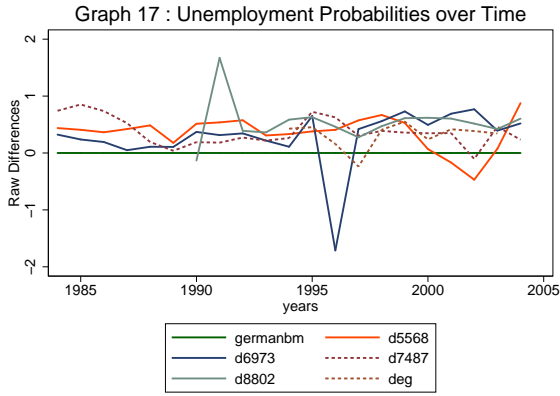
Appendix II: Evolution of Raw Differentials over Time

Chart 5: Graphs 11-16 Show Evolution of Raw Earnings Diff Over Time by Immigrant Group



The six graphs show the evolution numbers of each group over time by income quantiles. 1 means stemming from the 20 % of the sample who receive the lowest income, 2 means stemming from those 20 % who receive the second lowest income, and so on. The income quintiles have been calculated from the pooled sample.

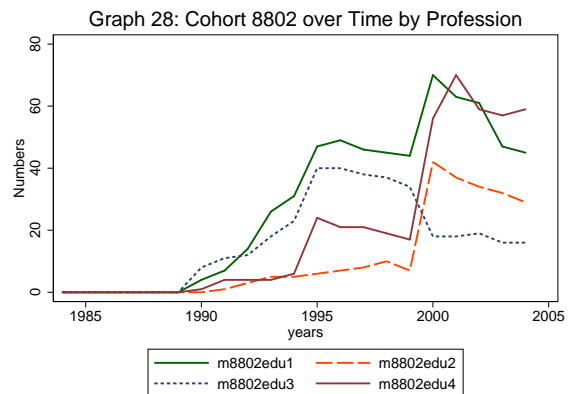
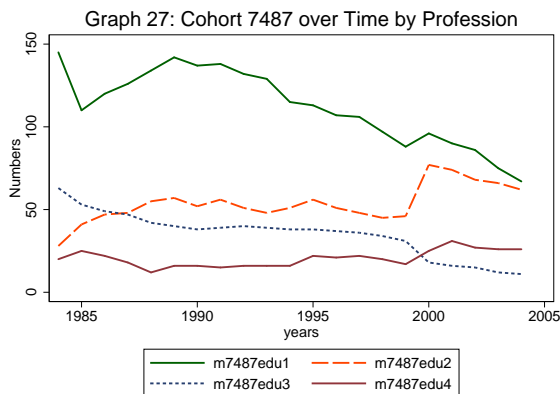
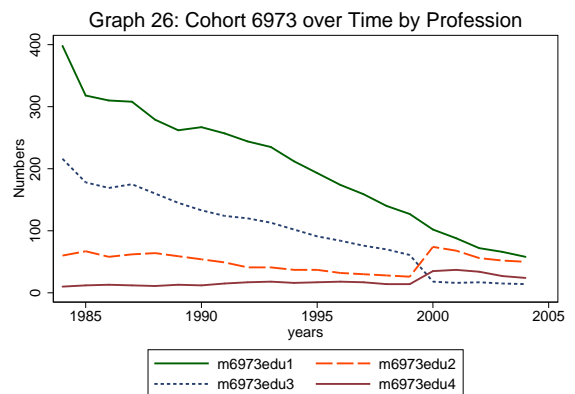
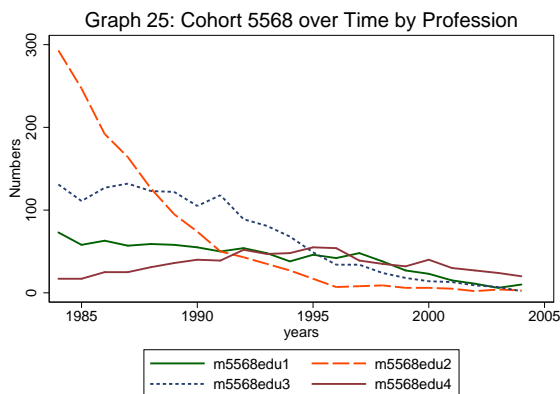
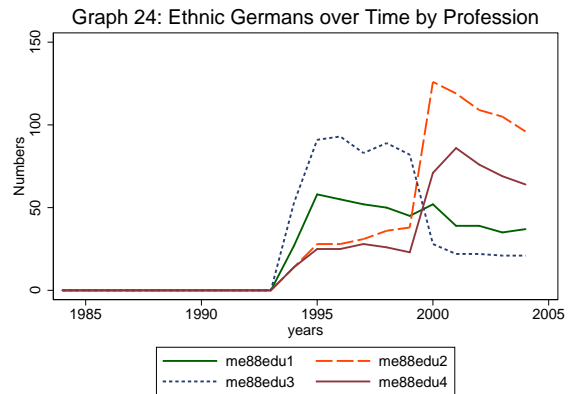
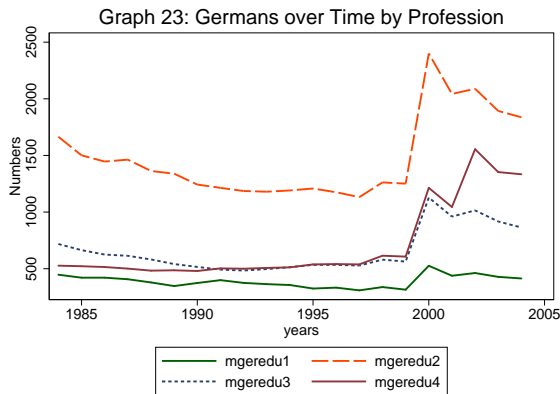
Chart 6: Graphs 17-22 Show Evolution of Raw Unemp Diff Over Time by Immigrant Group



The six graphs show the evolution of raw differentials for unemployment probabilities over time.

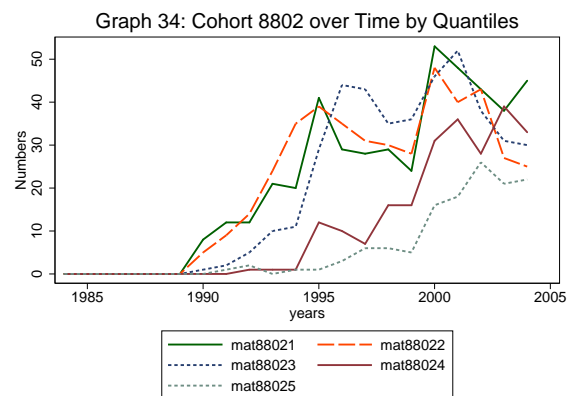
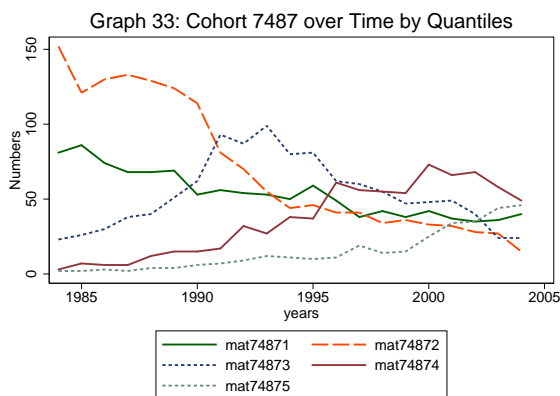
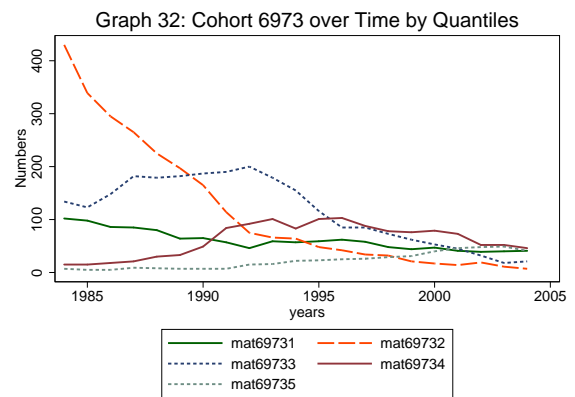
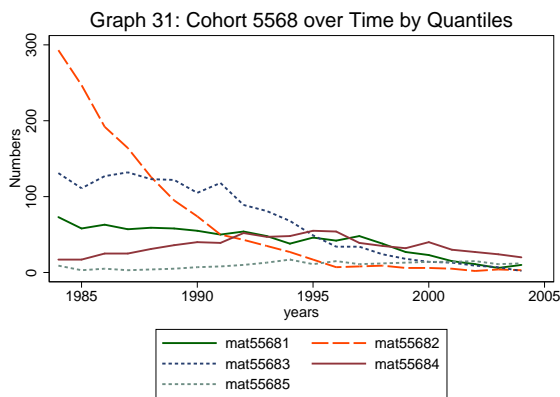
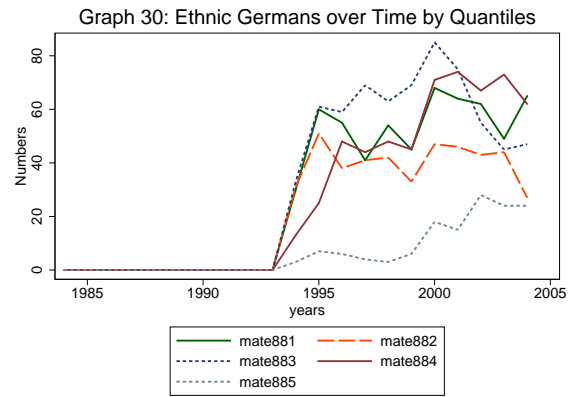
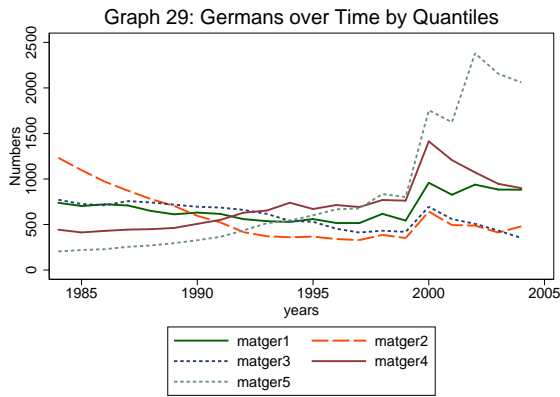
Appendix III: Evolution of Numbers over Time

Chart 7: Graphs 23-28 Show Evolution of Panel Participants Over Time by Groups and Professional Degree



The six graphs show the evolution numbers of each group over time by profession. Profession 1 means no professional training, profession 2 means the individual has acquired an apprenticeship, profession 3 means the individual has acquired a technocratic education, and profession 4 means the individual has a university degree.

Chart 8: Graphs 29-34 Show Evolution of Panel Participants Over Time by Groups and Income Quintiles



The six graphs show the evolution numbers of each group over time by income quintiles. 1 means stemming from the 20 % of the sample who receive the lowest income, 2 means stemming from those 20 % who receive the second lowest income, and so on. The income quintiles have been calculated from the pooled sample.