

Gundel, Sebastian; Peters, Heiko

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## What Determines the Duration of Stay of Immigrants in Germany? Evidence from a Longitudinal Duration Analysis

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on Multidisciplinary Panel Data Research

# 79

Sebastian Gundel  
Heiko Peters

**What Determines the Duration of Stay  
of Immigrants in Germany?  
Evidence from a Longitudinal Duration Analysis**

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German Socio-Economic Panel Study (SOEP)  
DIW Berlin  
Mohrenstrasse 58  
10117 Berlin, Germany

Contact: Uta Rahmann | [urahmann@diw.de](mailto:urahmann@diw.de)

# WHAT DETERMINES THE DURATION OF STAY OF IMMIGRANTS IN GERMANY? EVIDENCE FROM A LONGITUDINAL DURATION ANALYSIS\*

## Authors

Sebastian Gundel, University of Muenster, Center of Applied Economics, Am Stadtgraben 9, 48143 Muenster, Email: [gundel@insiwo.de](mailto:gundel@insiwo.de), phone: +49 251 8322976.

Heiko Peters, University of Muenster, Institute for Economic Education, Scharnhorststr. 100, 48151 Muenster, Email: [heiko.peters@wiwi.uni-muenster.de](mailto:heiko.peters@wiwi.uni-muenster.de), phone: +49 251 8324308.

## ABSTRACT

*We analyze the return-migration of German immigrants using the latest data of the German Socio-Economic Panel from 1984 to 2006. We conduct a Cox proportional hazard model with years of residence in Germany as waiting time. The analysis reveals that return migration is heavily influenced by country of origin. Individuals from countries with free labor movement agreements with Germany show a considerably higher likelihood of leaving the country relative to the others. The main finding is, with respect to the self-selection process we discovered that highly skilled are more likely to return than the less skilled. In addition, the results give plenty of information regarding the design of German immigration policy.*

Keywords: Remigration, Cox proportional hazard model, Germany  
JEL Code: C41, F22, J10, J61

## INTRODUCTION

Since the huge influx of guest-workers to Germany starting in the 60ties and the inflow of ethnic Germans associated with the fall of the “iron curtain”, Germany became an immigration country. Nowadays, the share of foreign born accumulates to almost 10 per cent. In this sense, immigration policy is an important issue for Germany within the scope of debating about the ageing of the native population and the lack of high skilled workers in some strong growing industries.

Whereas immigration already receives a lot of attention in economic literature, remigration<sup>2</sup> has been of minor interest so far. For sure, this particularly is due to the lack of longitudinal immigrant data in many countries. Remigration is crucial with respect to the success of immigration policy. There are several rea-

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<sup>2</sup> Remigration, emigration, outmigration and return-migration are all different to some extent, but are used as synonymous terms in this paper. They indicate that the immigrants move back to their home country after they have stayed in the host country.

sons for return-migration being an important issue. First, it helps assessing the success of the assimilation and integration of immigrants. Second, it helps forecasting trends in immigrant behaviour and eases the evaluation of immigrants on social systems (see Constant and Massey (2003) [5], p. 632). In addition, the phenomenon of outmigration is far from marginal. In Germany the number of outmigration is substantial represented by 639 064 people leaving the country in 2006, 80 per cent of them being former immigrants. This results in a positive immigration balance of 22 791 people.

While remigration and immigration decisions are mainly based on similar cost-benefit calculations subject to information constraints, there are differences: Immigrants in the guest country – potential remigrants – are more prone to migrate than other individuals because they have already once made a similar decision. Immigrants in the guest country have more precise information about the conditions in the home and in the guest country (see also Allen (1979) [1] and Sjaastad (1962) [19]). Remigration is based to a greater extent on non-economic reasons, because immigrants potentially feel not accepted or are disappointed regarding their expectations of the destination country.

Our outmigration analysis in this paper is based on a set of factors influencing return migration and also being proved in previous empirical findings. The determinants can be summarized in personal characteristics (age groups, gender, country of origin, marital status), human capital variables (skill level, language proficiency), labour market integration (level of employment) and financial or wealth-related variables (remittances, dwelling). Based on these covariates we want to identify the characteristics of return migrants conditional on their years of residence in Germany using the most actual data of the German Socio-Economic Panel (GSOEP). As to our best knowledge, this is the first analysis that uses the Cox proportional hazard model to investigate return-migration in Germany. With this model, we are able to estimate the likelihood of remigration with respect to each single year of residence in the guest country conditional on the set of time variant and time invariant covariates. This should enable us to make a statement about the remigration behaviour in Germany being consistent with the needs of the country.

The remainder of this paper is organized as follows. The next section describes the related literature on return migration, theoretically as well as empirically for Germany. The section after compiles the design of the Cox proportional hazard model used for estimation, describes the data design and provides some summary statistics. Thereafter we present the empirical results of the regressions and present some illustrative graphs. The last section concludes.

## RELATED LITERATURE ON RETURN MIGRATION

In her repeat migration analysis DaVanzo (1983) [7] took into account that migration cannot be assessed in a one-period model. Taking into account the multi-period character of migration decisions, she investigated the importance of correct information of previous migrants about the destination country and found several determinants of repeat migration like age, education, employment and location specific capital. Djajic and Milbourne (1988) [8] analyzed the intertemporal optimization solution of guest-worker migration theoretically. They highlighted the importance of utility maximizing individuals with finite working time. They found immigrants exhibiting greater preferences for consumption in the home country relative to the guest country. Roed and Stark (1998) [21] emphasized the importance of human capital in the process of migration decision. Immigrants can enhance skills for work at home in the guest country in a manner that is not possible in the home country. Borjas (1989) [3] and Jasso and Rosenzweig (1988) [16] first addressed the selection process guiding the outmigration decision conceptually and empirically. Borjas (1989) [3] found out, based on a special longitudinal survey of natural and social scientists, that least successful scientists and engineers are most likely to emigrate from the US and concludes that there is a negative outmigration selection process with respect to integration in the guest country. Further, Borjas and Bratsberg (1996) [4] theoretically derived a remigration selection process subject to the initial immigration selection. If the immigrants were positively (negatively) self-selected, i.e. individuals with higher (lower) than average human capital, the worst (best) of the best (worst) emigrate. In this sense, emigration amplifies the initial selection of immigration, regardless of whether it is positive or negative.

Summarized, Borjas and Bratsberg's (1996) [4] theoretical analysis revealed that outmigration can arise for two reasons. First, as a part of the optimal life cycle planning, immigrants leave the country after they accumulated a certain level of human capital, financial resources or wealth. Second, outmigration is a result of not successful integration based on erroneous information about the guest country.

In the case of German immigrants, researchers have the advantage to revert to a longitudinal person specific data set with reliable information about the year of actual remigration.<sup>3</sup> Schmidt (1994) [18] run probit regressions in order to assess the return migration using the waves 1984-1989 of the GSOEP. He highlighted the importance of the position of immigrants in their life-cycle and their family structure. Dustmann (1996) [10] performed probit regressions on intended returns and actual returns of immigrants using the GSOEP for the period 1984-1993. He uncovered a strong impact of country of origin and age.

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<sup>3</sup> We do not present studies (Steiner and Velling (1992) [20] and Dustmann (1993) [9]) that analyze return migration using the self-reported expected duration of stay as a proxy for actual return migration because intention and reality contradict (see Beenstock (1996) [2], p. 591, Dustmann (1996) [10], p. 234 and Schmidt (1994) [18], p. 121).

In another paper based on the GSOEP, Dustmann (2003a) [12] emphasises the importance of the welfare of immigrants children for the remigration decision. Dustmann (2003b) [13] explained in a different study the differences of the duration across immigrants by variations in host country wages, individual characteristics, time dummies and country of origin dummies theoretically and empirically. He found an inversely U-shaped relationship between wages in the host country and migration durations. Constant and Massey (2003) [3] applied a discrete time multinomial logisitic regression for survival analysis and non-repeatable one way transition events using 14 waves of the GSOEP (1984-1997). According to their results, employment status and remittances are important remigration determinants. Further, they find an inversely U-shaped relationship between the odds of returning and residence in Germany and that relative more successful immigrants leave the country. In a most recent paper, Sander (2007) [22] included the health status of immigrants into the analysis of return migration. She applied a random-effects probit model for the waves 1992 to 2005 of the GSOEP and found that men reporting poor health are less likely to return. It appears that empirical analysis of return migration focus on socio-economic characteristics of individuals. This is by virtue of the high importance of non-economic reasons but also due to the lack of data availability that enables to track foreigners when they returned to their home country.<sup>4</sup>

## **DATA AND METHODOLOGY**

### **Cox proportional hazard model**

The best way to investigate the duration and the likelihood of an occurring event is to use time-to-event data. Therefore, we observe the immigrants in Germany until they remigrate to their home country or stay in Germany. Ideally, the data contains individual information from the time of immigration to Germany until the individual dies or remigrates to his home country. Since immigrants are a heterogeneous group and have additional characteristics that affect their outcome, we have to incorporate these characteristics as covariates to explain the outcome of the remigration decision.

Our empirical framework that accounts for individual characteristics through the use of covariates is the Cox proportional hazard model (see Cox 1972) [6]. We use years of residence in Germany as waiting time concept. This enables us to estimate the likelihood of remigration for each year of residence in Germany conditional on the individual characteristics of the immigrants.

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<sup>4</sup> An exception is the work of Dustmann and Kirchkamp (2002) [11]. On the basis of a special data set they can observe Turks after their remigration decision.

The Cox model specifies the hazard for individual  $i$  as

$$\lambda_i(t) = \lambda_0(t)e^{X_i(t)\beta}. \quad (1)$$

The transition rate  $\lambda_i(t)$  for individual  $i$  is the product of the unspecified baseline hazard rate  $\lambda_0(t)$  and a linear specified influence of covariates  $X_i(t)$  on the transition rate. Due to the fact that the functional form of the baseline hazard rate is unspecified and the covariates enter the model linearly the Cox model is semiparametric.  $\beta$  is a row vector of parameters. The covariates could be both time dependent and fixed. As we estimate a proportional model the covariates can only shift the transition proportionally but cannot change its shape. This proportionality assumption has to be fulfilled in order to justify the estimation of the Cox model.

Since individual information from the time of immigration to Germany until the individual dies or remigrates is not available for all immigrants included in the sample, we face the problem of censoring and truncation. Particularly, we have to deal the problem of left truncation and right censoring in our data set. For immigrants that do not remigrate before the end of the observation period we only know that these immigrants are still in Germany. We do not know if these immigrants will remigrate to their home country in the future or will reside in Germany the rest of their life. This is called right censoring. The data is left truncated, because immigrants enter the data base at a random stock of years of residence and are followed from this delayed entry time until they remigrate or until they are right censored.

Right censoring as well as left truncation has to be taken into account when estimating the likelihood function of the Cox model. Since each immigrant has a different failure distribution the likelihood function can be constructed by

$$L = \prod_{i \in R} \frac{f_i(x_i)}{S(Y_i)} \prod_{i \in C} \frac{S_i(C_r)}{S(Y_i)}. \quad (2)$$



R is the set of the time of remigration and C the set of right-censored observations.  $f_i(x_i)/S(Y_i)$  are the left truncated observations of the exact duration of stay in Germany.  $S_i(C_r)/S(Y_i)$  are the right censored and left truncated observations.<sup>5</sup>

### Data and summary statistics

We use the latest data of the GSOEP for the period 1984-2006. The GSOEP is a yearly conducted household survey for Germany.<sup>6</sup> We restricted our sample to immigrants living in West Germany.<sup>7</sup> Further, we swept out all immigrants with limited permission of residence, because they are forced to out-migrate. For a similar reason, we consider only persons who are older than 18 because we assume that individuals under 18 year are unlikely to make an independent emigration decision. After correction for individuals exhibiting missing values and convert the panel data structure into time-to-event data, the data set contains 46232 observations representing 5104 individuals with immigration history.<sup>8</sup> 668 individuals are return migrants representing a share of 13.1 per cent. For each individual the GSOEP reports the reason for non-response one year after. As one category is migrating to a foreign country, this information is used to identify the emigrants.<sup>9</sup> Consequently, we could only use the period 1984-2005.

Table 1 shows the summary statistics of the immigrant sample. The sample contains 2641 men and 2463 women. Examining the total sample, immigrants who stay are with an average age of 42.9 slightly younger than remigrants with an average age of 44.6 years. However, if splitting the individuals into five age groups there are considerable differences. In the two age groups representing the life-cycle phase of prime work age (age 31-50) the share of immigrants who stay is bigger than that of remigrants. When the individuals approach (early) retirement age the differences are melting off. For the age group older than 60 this difference is even reversed. 13.2 percent of the immigrants belong to that group. In contrast, 28.5 percent of the remigrants represent this age group. Regarding the country of origin remigrants and immigrants display significant differences. Only a few of ethnic Germans and immigrants that received the German nationality are leaving the country. However, almost 60 percent of the remigrants come from an

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<sup>5</sup> See Klein and Moeschberger (1998) [16] for the detailed specification of the partial likelihood function. To handle tied failures we use the Breslow method.

<sup>6</sup> See Wagner et al. (2007) [23] and Haisken-DeNew and Frick (2005) [15] for a detailed description of the GSOEP.

<sup>7</sup> We only observe West Germany, because no data is available prior to reunification of Germany in 1989.

<sup>8</sup> With respect to missing values for some observation years for important variables we filled missing values for remittances and language proficiency with the observations of the year before. If there is no individual data in the year before we used the year after. Further, we constricted the data set to only persons who remigrated one time. For circular migrants we used the first remigration date and assumed that they leave the panel thereafter. Because of left truncation we do not know if remigration already occurred.

<sup>9</sup> Because of the fact that the country of outmigration is not specified, we assume that leaving to a foreign country is equivalent to going back to the home country (see for a similar procedures Constant and Massey (2003) [5], p. 637).

EU country while only 30 percent of the immigrants do. The share of immigrants from Non-EU countries is approximately equal for remigrants and immigrants. Leavers are more often married to a spouse in the home country than immigrants. Qualitatively, the results are similar for the sub group of men and woman. The only exception is the outmigration reversion effect for the age group 51-60 for women.

*[Table 1 about here]*

Considering human capital characteristics of immigrants, we find almost no difference between the fraction of highly skilled<sup>10</sup> among immigrants and remigrants not differentiated by gender. For men, more immigrants are high skilled than leavers, while this is contrary for women. With 41.9 per cent, considerably more immigrants exhibit a good proficiency of German language than remigrants at 31.2 per cent. This relation holds for the sample of men and women. Being employed in Germany is a characteristic that 66.2 per cent of immigrants obtain, while only 51.5 per cent of the remigrants do. This proportion is amplified for men. Remigrants transfer slightly more money to the home country than the immigrants that stay in Germany. Differentiated by gender, the proportion of men paying remittances is substantially higher than for women. Another capital related issue is the ownership of dwelling. Almost twice as much of the immigrants live in their proprietary than remigrants.

## **EMPIRICAL RESULTS**

In order to estimate the likelihood of emigration subject to the duration of residence in Germany we conduct the Cox proportional hazard model regression specified in equation (1). We performed the regressions for the total sample and for the subsamples of men and women, because the remigration behaviour might differentiate by gender. Our model specification includes fixed and time dependent covariates. All covariates are dummy variables. The time invariant variables are sex, being ethnic German, holding the German nationality and coming from an EU country. In the case of the country of origin, coming from a Non-EU country is the reference group. The time dependent variables are the 4 age groups. Being between 31 and 40 years old serves as the reference group. Further dummy variables are having a spouse in the home country, being highly skilled, speaking good German, being employed, transferring remittances, obtaining dwelling interacted with an age group indicating persons older than 40.<sup>11</sup>

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<sup>10</sup> High skilled is defined by ISCED-1997-Classification level 5 (higher vocational) and 6 (higher education).

<sup>11</sup> The covariates receiving benefits or pension and age up to the third polynomial could not be included in the regression because they do not fulfil the proportionality assumptions according to the Schoenfeld residual test. In several model specifications we controlled for wage and logarithm of wage, respectively. Using wage, we had to drop employment status because of collinearity. As we are more interested in the impact of labour market integra-

The regression results are presented in table 2. For the total sample we find the theoretically expected relationship between age and remigration. The youngest age group has a higher likelihood to remigrate than the persons belonging to the age groups representing the core labour force. These are the age group 41-50 and the reference group, which do not display significant differences. Beginning at the age of 51 the first persons start to go into early retirement or already have accumulated enough capital and are therefore more prone to return to their home country. People older than 60 years display a 340 percent higher hazard rate to remigrate than the reference group. This overwhelming result highlights the importance of life cycle considerations. Further, the utility of consumption is usually higher in the home country.<sup>12</sup> We could not detect a statistically significant difference between men and woman. With respect to country of origin we uncover significant heterogeneity. As expected, immigrants being enrooted to Germany most, like ethnic Germans and immigrants with German nationality, represent a substantially lower likelihood to remigrate than immigrants from Non-EU countries. Immigrants from EU countries are allowed to move and work freely within the EU and usually exhibit lower migration costs due to geographic proximity.<sup>13</sup> This amplifies their hazard rate by 231 per cent, because their decision to leave Germany is easily reversible compared to Non-EU countries with restricted labour movement. Married to a spouse at home is associated with a considerable increase of the hazard rate.

If differentiating the sample by gender, we find no significant difference between the three first male age groups and the reference group. For women, we discover that married to a man at home is insignificant. All other results have the same direction of the likelihood to remigrate compared to the reference group.

*[Table 2 about here]*

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tion for the remigration decision and with respect to the ambiguous theoretically effect of wage (see Dustmann (2003b) [13], p. 355-357), we opted for employment status. In addition, we restricted the observation period to 1990-2005 because the bulk of ethnic Germans entered thereafter. The results are robust. Another time aspect we controlled for were entry cohorts. We set up two dummies, one for the 1974-1983 and the 1990-2005 entry cohorts reflecting two different immigrant flows. The effect is insignificant and the inclusion does not change the results. As we restricted our data to persons with independent remigration decision by excluding immigrants with temporary permissions of residence our results are not biased thereby. For example, immigrants that are forced to return after they completed their education would lead to an upward estimation bias. One remaining caveat of the regression is the construction of the dummy variable indicating the failure event. We assigned all immigrants that have not responded, but did not move abroad to the group of immigrants. As some of these non-responding individuals are potential remigrants, we may underestimate the true extent of return.

<sup>12</sup> See Djajic and Melbourne (1988) [8], p. 337 and Dustmann (1996) [10], p. 226.

<sup>13</sup> For the Eastern European countries belonging to the EU since 2004 there are still some regulations with respect to the free movement of labour for Germany. Thus, in the construction of the country variables they still belong to Non-EU countries.

Turning to the human characteristics of immigrants, the expected direction of influence depends on the selection process of initial immigration. In Germany, we assume an initial negative self-selection of immigrants with respect to quality due to the relatively compressed wage distribution and beneficial social security system. According to theory (see Borjas and Bratsberg (1996) [4]), this negative selection holds true for the immigrants and thereby amplifies the total selection process. Our results discover that high-skilled persons compared to the reference group are 61 per cent more prone to leave Germany. This positive self-selection with respect to skill of remigrants is more pronounced for women relative to men. Good proficiency in the guest country language eases the integration and is often an important job qualification. Therefore, we expect good knowledge of the German language increases the duration of stay. The remigrants with good German language skills in our sample reveal a 26 per cent reduced hazard rate. This aspect of emigration behaviour holds true for men and women.

Working in Germany reduces the likelihood of returning by 18 per cent. This effect is aggravated to 28 per cent for men, but insignificant for women.<sup>14</sup>

According to the financial capital, we anticipate immigrants who transfer money to the home country exhibiting a higher outmigration propensity. On the one hand, remittances reflect the linkages to the home country. On the other hand, remittances can serve as capital accumulation in the home country for the life phase planning after remigration, either business or consumption. The hazard rate of immigrants who transfer remittances is 33 percent higher compared to immigrants who do not. For men this effect is slightly higher, while it becomes insignificant when regarding only women. Two reasons might be that women transfer less than men and the share of women married to the home country is negligible.<sup>15</sup> Own-ing property associated with specific investment deters people from moving. Accordingly, we expect immigrants living in their own dwelling experiencing lower hazards to leave the guest country. The likelihood of emigration is 44 per cent lower for immigrants older than 40 and living in their own dwelling.<sup>16</sup> This effect is more pronounced when regarding only men, but insignificant for women.

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<sup>14</sup> We also controlled for the interaction of being high skilled and employed in the model specification. This is done in order to control for individuals who are students and not employed and for the high fraction of retired individuals leaving Germany. The estimation exhibited the same direction of influence, qualitatively even slightly higher for employed high skilled individuals.

<sup>15</sup> In order to assess this linkage in more depth, we have to include more socioeconomic variables that reflect the family structure. Unfortunately, the GSOEP reports these variables in the BIOIMMIG-file only for the period since 1994. Restricting the analysis for that period and correcting for missing data reduces the observations too much for assessing return migration. Additionally, a long observation period is crucial for duration analysis.

<sup>16</sup> We interact the dummy variable dwelling with the dummy variable older than 40 because the use of solely dwelling violated the proportionality assumption.

For a more detailed analysis of the remigration hazards, we plot survival functions for different individual characteristics of the immigrants.<sup>17</sup> The survival curve shows the percentage of observed individuals staying in Germany at each year of residence since immigration. In our sample the maximum duration of residence observed is 57 years.<sup>18</sup> Figure 1, left side, depicts the survival rates of individuals differentiated by skill level and labour market integration. The graphs illustrate the above findings. Both survival functions of high skilled, being either employed or not, are located below the trajectories of the not high skilled. For both, high skilled and not high skilled, integration in the labour market amplifies the share of immigrants who stay. After 50 years in Germany only slightly above 50 per cent of the high skilled and not employed immigrants are still in Germany. Being employed increases this share by almost 10 per cent. Contrary, after 50 years residing in Germany, still more than 70 per cent of the not high skilled and employed live in Germany. This share is already attained for high skilled and employed immigrants after just 20 years. On the right side of Figure 1, we can see that high skilled immigrants from EU countries remain substantially shorter in Germany than equally skilled immigrants from Non-EU countries. After 20 years since migration only about 45 per cent of the immigrants originating from EU countries are still in Germany. For immigrants from Non-EU the fraction of immigrants who stay is approximately 35 per cent higher.

*[Figure 1 about here]*

On the left side of Figure 2 we can see survival trajectories of immigrants separated by country of origin. As indicated by the hazard rates calculated above, almost all ethnic Germans stay throughout the waiting time. Immigrants that acquired the German nationality exhibit also a high share of immigrants. For Non-EU immigrants the fraction of immigrants is nearly 85 per cent after 20 years of residence and slightly below 80 per cent thirty years later. The immigrants from EU countries are more prone to emigrate. They exhibit a steep decline in their survivor rates in the first 20 years of residence. 40 per cent of them already emigrated, whereas another 20 years later only 15 per cent emigrate additionally. The right side of Figure 2 depicts the survival functions of the different age groups. For the youngest age group between 18 and 30 we expect a higher rate of remigrants than for the core working age groups. This could be a result of the immigrants making use of the relatively good German education system and returning thereafter in order to exploit high rates of return for educational attainment in the home country. Another reason for

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<sup>17</sup> We performed the log rank test and the Wilcoxon-Breslow-Gehan test of equality of survival functions and could not accept the null hypothesis of equality for all survival functions.

<sup>18</sup> After 10 years of residence 122 immigrants have emigrated, after 20 years 334 immigrants, after 30 years 573 immigrants, after 40 years 662 immigrants and after 50 years 668 immigrants. The baseline hazard function shows the expected curve progression. It peaks at nine years of residence in Germany and slopes down with each following year of residence.

shorter stays in Germany are problems of successfully starting the working career. The visual inspection ten years after immigration shows that 17 per cent of the youngest immigrant group has returned to their home country. For the older immigrants, we can clearly discover the work-retirement-age pattern described above. 87 per cent of the core working age group remains in Germany after 10 years of residence. Contrary, from the age group 51-60 21 per cent have left Germany after 10 years. After the same duration of stay, only 58 per cent of the oldest age group are still in Germany.

*[Figure 2 about here]*

## CONCLUSION

While about 33 million people immigrated to Germany during the period 1965-2006, approximately 24 million people emigrated. Because of low fertility rates and a fast ageing population the balance of 9 million immigrants is by far not sufficient to soften this problem. Among the emigrants are a lot of former immigrants returning to their home countries. Therefore, it is important to investigate the underlying reasons to remigrate in order to adjust the immigration policy to the needs of Germany. Our analysis discovered the likelihood to go back to the home country is substantially higher for high qualified immigrants relative to lower qualified. Particularly with regard to Germany, this increases the shortage of high qualified labour instead of overcoming this bottleneck. In this sense, it is crucial to reduce the number of out-migration of high qualified individuals. Further, we can show that return migrants are heterogeneous with respect to their country of origin. Immigrants that are closely connected to Germany, like ethnic Germans and immigrants who received the German nationality, discovered a relative low likelihood to remigrate compared to Non-EU immigrants. Contrary, immigrants from EU countries show high hazards to emigrate. The reasons for this are twofold. The decision is reversible due to the free movement of labour within the EU and the convenient geographic location of Germany in the middle of Europe reduces the direct migration costs. In the case of restricted movement, life cycle considerations can lead to a suboptimal decision of staying in Germany even if the integration is not successful. In addition, our results emphasize the importance of being integrated in the labour market and of obtaining a good proficiency in German language. According to the importance of being employed, we find evidence of the life-cycle hypothesis with immigrants in the prime work age experiencing significantly lower return probabilities. Further, financial investments in the home or guest country are found to increase the likelihood to return or to stay.

## FIGURES AND TABLES

**TABLE 1: SUMMARY STATISTICS**

	total sample		men		women	
	immigrants	re-migrants	immigrants	re-migrants	immigrants	re-migrants
<b>personal characteristics</b>						
age	42,9	44,6	43,5	45,4	42,3	43,9
age 18-30 (per cent)	20,5	19,3	19,6	18,2	21,3	23,2
age 30-40 (per cent)	22,8	17,3	21,6	19,1	24,1	13,3
age 40-50 (per cent)	23,6	16,1	23,1	13,8	24,1	15,3
age 50-60 (per cent)	19,9	18,8	21,4	14,7	18,3	23,9
age >60 (per cent)	13,2	28,5	14,3	34,2	12,2	24,3
women (per cent)	48,4	44,2	-	-	-	-
ethnic German (per cent)	12,3	1,3	12,1	1,2	12,5	1,4
German nationality (per cent)	26,9	5,9	25,4	6,1	28,4	5,4
EU (per cent)	29,7	59,7	31,8	59,6	27,5	60,3
Non-EU (per cent)	31,1	33,1	30,7	33,1	31,6	32,9
married home country (per cent)	0,9	3,1	1,4	4,7	0,4	1,1
<b>human capital</b>						
high skilled (per cent)	9,0	8,9	9,6	8,8	8,3	8,8
language proficiency (per cent)	41,9	31,2	46,3	33,2	37,0	29,1
<b>labor market integration</b>						
employment status (per cent)	66,2	51,5	78,6	59,2	52,8	42,1
<b>financial capital</b>						
remittances (per cent)	18,4	19,5	23,6	26,3	12,2	11,4
dwelling over age 40 (per cent)	12,0	6,4	12,3	6,4	11,7	6,3

Source: Own calculations with GSOEP data.

**TABLE 2: COX MODEL ESTIMATION RESULTS (WAITING TIME CONCEPT: YEAR OF RESIDENCE)**

	total sample		men		women	
	hazard ratio	std. err.	hazard ratio	std. err.	hazard ratio	std. err.
<b>personal characteristics</b>						
age 18-30	1,388	(0,184) **	1,040	(0,193)	1,892	(0,365)***
age 40-50	0,960	(0,136)	0,757	(0,146)	1,240	(0,260)
age 50-60	1,755	(0,238)***	1,199	(0,225)	2,721	(0,546)***
age >60	4,402	(0,653)***	3,820	(0,780)***	4,821	(1,08)***
sex	0,983	(0,084)	-	-	-	-
ethnic German	0,074	(0,031)***	0,070	(0,042)***	0,077	(0,046)***
German nationality	0,239	(0,600)***	0,340	(0,103)***	0,136	(0,063)***
EU	3,310	(0,288)***	2,983	(0,355)***	3,724	(0,478)***
married home country	2,501	(0,546)***	2,775	(0,656)***	1,387	(0,989)
<b>human capital</b>						
high skilled	1,610	(0,235)***	1,521	(0,296)**	1,715	(0,384)**
language proficiency	0,736	(0,067)***	0,716	(0,087)***	0,777	(0,108)*
<b>labor market integration</b>						
employment status	0,824	(0,08)**	0,718	(0,108)**	0,885	(0,112)
<b>financial capital</b>						
remittances	1,327	(0,132)***	1,372	(0,175)**	1,288	(0,214)
dwelling over age 40	0,560	(0,101)***	0,499	(0,124)***	0,663	(0,173)
number of observation	46232		23934		22298	
number of subjects	5104		2641		2463	
number of failures	668		357		311	
log likelihood	-4431,23		-2134,02		-1828,31	
LR $\chi^2$	670,04 ***		349,87 ***		341,18 ***	

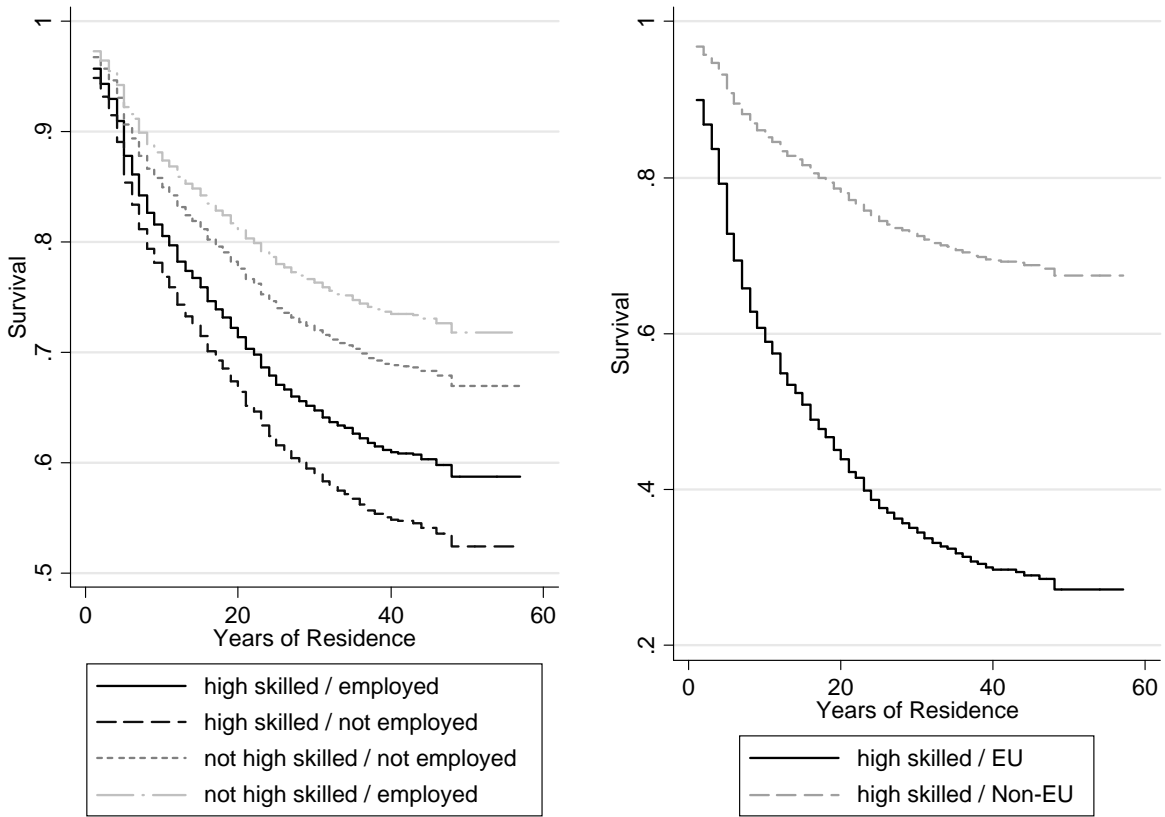
Notes. - \* significant at 10%; \*\* significant at 5%; \* significant at 1%

To test the proportional hazard assumption we performed the link test. According to the link test the squared linear predictor is insignificant and so the model is correctly specified. To check the proportional hazard assumptions for the global model and for each covariate we used the Schoenfeld residual test based on a generalization by Grambsch and Therneau (1994) [13]. The global model and each covariate included in the estimation results fulfil the proportional hazard assumption.

Source: Own calculations with GSOEP data.

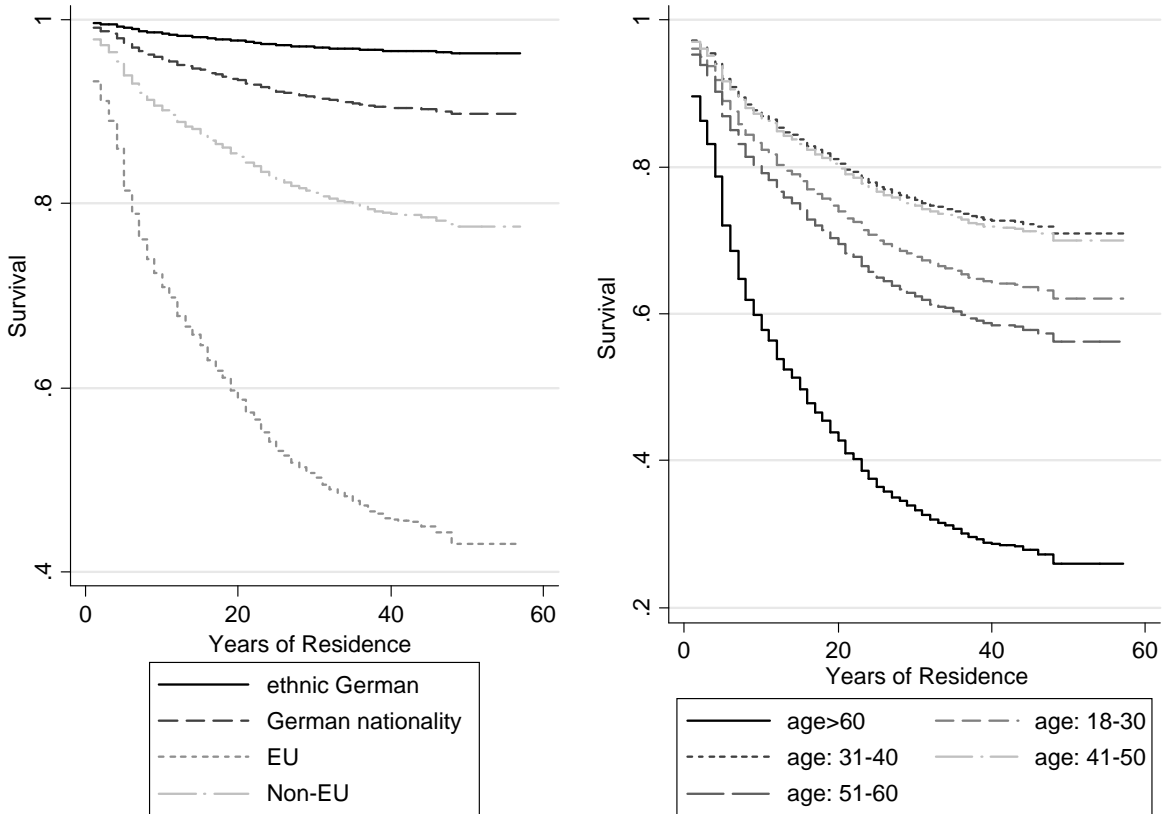


**FIGURE 1: SURVIVAL FUNCTION, SKILL LEVEL**



Source: Own calculations with GSOEP data.

**FIGURE 2: SURVIVAL FUNCTION, NATIONALITY AND AGE GROUPS**



Source: Own calculations with GSOEP data.

## REFERENCES

- [1] Allen, J. (1979), "Information and Subsequent Migration: Further Analysis and Additional Evidence", *Southern Economic Journal*, Vol. 45, pp. 1274-1284.
- [2] Beenstock, M. (1996), "Failure to Absorb: Remigration by Immigrants into Israel", *International Migration Review*, Vol. 30, pp. 950-978.
- [3] Borjas, G. (1989), "Immigrant and Emigrant Earnings: A Longitudinal Study", *Economic Inquiry*, Vol. 27 (Jan. 1989), pp. 21-37.
- [4] Borjas, G. and Bratsberg, B. (1996), "Who Leaves? The Outmigration of the Foreign-Born", *The Review of Economics and Statistics*, Vol. 78, pp. 165-176.
- [5] Constant, A. and Massey, D. S. (2003), "Self-selection, Earnings, and Out-migration: A Longitudinal Study of Immigrants to Germany", *Journal of Population Economics*, Vol. 16, pp. 631-653.
- [6] Cox, D.R. (1972), "Regression Models and Life Tables", *Journal of the Royal Statistical Society*, Vol. 34, pp. 187-220.
- [7] DaVanzo, J. (1983), "Repeat Migration in the United States: Who moves back and who moves on?", *The Review of Economics and Statistics*, Vol. 65, pp. 552-559.
- [8] Djajic, S. and Milbourne, R. (1988), "A General Equilibrium Model of Guest-Worker Migration", *Journal of International Economics*, Vol. 25, pp. 335-351.
- [9] Dustmann, C. (1993), "Return Intentions of Temporary Migrants", Department of Economics, University of Bielefeld, April.
- [10] Dustmann, C. (1996), "Return Migration – The European Experience", *European Policy: A European Forum*, Vol. 22, pp. 214-250.
- [11] Dustmann, C. and Kirchkamp, O. (2002), "The optimal migration duration and activity choice after remigration", *Journal of Development Economics*, Vol. 67, pp. 351-372.
- [12] Dustmann, C. (2003a), "Children and return migration", *Journal of Population Economics*, Vol. 16, pp. 815-830.
- [13] Dustmann, C. (2003b), "Return Migration, Wage Differentials, and the Optimal Migration Duration", *European Economic Review*, Vol. 47, pp. 353-367.
- [14] Grambsch, P. M. and Therneau, T. M. (1994), "Proportional hazards tests and diagnostics based on weighted residuals", *Biometrika*, Vol. 81, pp. 515-526.

- [15] Haisken-DeNew, J. P. and Frick, J. R. (2005), "Desktop Companion to the German Socio-Economic Panel Study (GSOEP), Version 8.0 – Update to wave 21", DIW Berlin.
- [16] Jasso, G. and Rosenzweig, M. R. (1988), "How well do US Immigrants do? Vintage Effects, Emigration Selectivity, and Occupational Mobility", *Research in Population Economics*, Vol. 6, pp. 229-253.
- [17] Klein, J. P. and Moeschberger, M. L. (1998), "Survival Analysis: techniques for censored and truncated data", New York
- [18] Schmidt, C. M. (1994), "The Country of Origin, Family Structure and Return Migration of Germany's Guest-Workers", *Vierteljahreshefte zur Wirtschaftsforschung*, Vol. 63, pp. 119-125.
- [19] Sjaastad, L. A. (1962), "The Cost and Returns of Human Migration", *The Journal of Political Economy*, Vol. 70, pp. 80-93.
- [20] Steiner, V. and Velling, J. (1992), "Remigration Behaviour and Expected Duration of Stay of Guest-Workers in Germany", in: Steinmann, G., *The Economics Consequences of Immigration to Germany*, Heidelberg, pp. 101-119.
- [21] Roed, M. and Stark, O. (1998), "On the Optimal Duration of Migration", in: *Lanour, food and poverty Vol. 2, Proceedings of the Eleventh World Congress of the International Economic Association*, Mundlak, Y., pp. 133-146.
- [22] Sander, M. (2007), "Return Migration and the 'healthy immigrant effect'", *SOEPpapers on Multidisciplinary Panel Data Research*, No. 60, DIW Berlin.
- [23] Wagner, G. G., Frick, J. R. and Schupp J. (2007), "The German Socio-Economic Panel Study (SOEP) – Evolution, Scope and Enhancements", *Schmollers Jahrbuch*, Vol. 127, pp. 139-169.