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# Between Life Cycle Model, Labor Market Integration and Discrimination: An Econometric Analysis of the Determinants of Return Migration\*

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## Abstract

This paper studies the determinants of return migration by applying the Cox hazard model to longitudinal micro data from 1996 to 2012, including immigrants of a wide range of nationalities. The empirical results reveal the validity of the life cycle model of Migration Economics and a strong return probability decreasing effect of labor market integration and societal integration. Modeling non-proportional effects of qualification and obtaining social benefits supports the human capital thesis and supplies new insights with regard to the supranational European labor market and to development policy. At the beginning of residence highly qualified immigrants as well as immigrants obtaining social benefits display a rather high hazard ratio that, however, decreases each additional year of residence afterwards. Via survivor functions further remarkable results about adverse selection effects and about the interaction between qualification and labor market integration can be found. Finally the paper derives important policy implications from the empirical analysis with a special focus on the interface between public economics and development policy.

Keywords: Return Migration, Migration Behavior, European Development Policy, Cox Hazard Model

JEL-Classification: C41, J15, J61, O15

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# 1 Introduction

The proceeding European integration including legal free movement of workers, the apparent current relative economic attractiveness of Germany, raising migration flows and the demand for qualified workers in Germany have pushed the topic of migration into the center of attention of the political debate and of research in European public finance. The empirical analysis of return decisions of foreign-born immigrants, that have lived in Germany for a while, will give a deeper insight into the behavior of migrants considering a welfare state including a generous system of social security.

Econometric studies, that explicitly look at the determinants of return migration, have been rarely conducted in spite of high economic-political relevance. Long-term balance of public finance and economic utility from migration does depend on both the immigration flow as well as on the emigration flow and particularly on the duration of residence, an immigrant lives and works in the host country. The years of residence as well as the wage and the employment status determine the accumulated contributions to the public old-age pension system. This paper outlines, how the immigration of highly qualified and employable migrants and a long residence of these persons can disburden the old-age pension system, also in conjunction with a high volatility of growth rates of foreign-born employees that pay contributions to Germany's old-age pension (Keck, 2014).

Considering Germany's old-age pension system, furthermore, the link between increasing age and return migration is highly relevant. Thus, the conducted econometric analysis sheds light into the question, whether and how does migration behavior react with increasing age and while approaching to the official retirement age.

Due to an expected link between migration behavior and the public financing of social security, it will be examined whether there exists a systematic abuse of the German welfare state from increasing numbers of immigrating people. Thus, the structure of adverse selection effects and the composition of return migration flows due to labor market performance, employment status and obtaining social benefits, have to be examined. This supplies a new perspective on theory behind adverse selection effects and helps to scrutinize the presumption of literature, whereas immigrants with a bad labor market integration return more likely home. Thus, another aim of policy is evaluated, namely the question whether generous social benefits and a low qualification undermine the positive aspects of legal free movement of workers within the European Union and lower labor mobility.

Furthermore, the empirical analysis of the determinants of return migration helps to evaluate the success of integration policy and to forecast future migration flows, depending on instruments of German migration policy. Is there a link between societal integration, duration of residence and return decisions? This is the first paper that studies the link between discrimination and return migration behavior. According to the pyramid of needs (Maslow, 1954), this paper asks whether discrimination influences the migration behavior of highly qualified and occupied immigrants, that do not have any problems to fulfill their basic and physiological needs.

Moreover, the supranational perspective of development policy is considered in detail by taking the human capital hypothesis into account, meaning in detail that a tem-

porary residence of young immigrants, the collection of human capital in Germany and a following return migration may serve as an efficient instrument of development aid. Due to the so called (bilateral) mobility partnerships, European Union enables highly educated immigrants from development countries to collect labor market experience in Europe to finally stimulate economic growth and productivity at home after return migration. To evaluate this development policy aim, the interaction between labor market success and education (or qualification) needs to be analyzed. To realize an actual brain gain after immigration to one European country, these highly educated immigrants from development countries should return even after realizing success on European labor markets. Otherwise there cannot be measured any brain gain. Thus, analyzing the interaction between qualification and labor market performance is another main aim, this paper focalizes on.

After having outlined the economic relevance of return migration, section 2 provides an overview over the literature and summarizes theoretical models that supply hypotheses that will be tested empirically. Section 3 describes the Cox hazard model as the applied econometric method and the data of German Socio-Economic Panel (GSOEP). Section 4 illustrates the baseline empirical results of Cox hazard estimation for the period 1996–2012. Afterwards, section 5 supplies further investigations and considers the interaction between labor market performance and qualification and tackles the issues that macroeconomic developments in the home country may affect return migration and that return decisions are seldom individualistic choices and on the contrary, are often made by the whole family or household company. Finally, important policy implications from the empirical analysis with a special focus on the interface between public economics and development policy are derived.

## 2 Theoretical framework and literature

Because a migration decision can be seldom derived from one single factor, there will various sequences of different theories, hypotheses and models that have to be taken into account. Initially, section 2 gives an outline of the most important theories, that treats the life cycle model, hypotheses of labor market integration and of discrimination sequentially.

### 2.1 The life cycle model of Migration Economics

The life cycle model of Migration Economics, that is part of the New Economics of Labor Migration, serves as a senseful starting point to consider the determinants of the individual decision of return migration because this model focalizes purely on economic and demographic variables, namely the age of immigrants, wages and savings (Behrens et al., 2007). For now other socio-economic factors, cultural characteristics and variables of societal integration do not matter.

This section mostly refers to formal derivations of Kirdar (2007) and Cobb-Clark and Stillman (2013), whose works base on Hill (1987). Similar to the general model of Modigliani (see for instance Ando and Modigliani, 1963), the life cycle model of Migration Economics considers an immigrant that allocates her income optimally

over her whole life. The life cycle model of Migration Economics clarifies the trade-off between a higher wage in the host country and a higher purchasing power in the home country. By taking interest rates in the host and the home country as zero, and thus excluding a liquidity motive and any possibility of borrowing a credit, the starting point of this model is the supposition that the wage in the host country is higher than the wage at home:  $w^* > w$ .<sup>1</sup>

Realizing this wage advantage, individual  $i$  immigrates primarily at point in time  $t = 0$  to the host country. According to the higher wage  $w^*$ , the accumulation of a given level of planned savings can be reached quicker than at home. The life between immigration at  $t = 0$  and death at  $t = 1$  is split into two periods, namely the period before and after retirement. Before retirement savings equal the over time accumulated wage minus the realized consumption. After retirement accumulated savings equal savings that have been collected till retirement minus consumption that has been realized since retirement. After having accumulated a sufficient big enough amount of savings, that has been accumulated in the host country, individual  $i$  re-emigrates because a lower price level at home allows the individual to realize a higher degree of purchasing power there ( $p < p^*$ ). At home individual  $i$  consumes savings, that have been accumulated in the host country until return migration at the optimal migration point in time  $t^*$ . So individual  $i$  is exposed to a trade-off at each point in time until he decides to retire. In the host country there exists the possibility of reaching a higher income each period till retirement due to the positive wage differential ( $w^* > w$ ), however, by staying in the host country he dismisses simultaneously a potentially higher degree of consumption each period at home. Cobb-Clark and Stillman (2013) show formally that before retirement the return probability increases as long as the utility of a higher wage in the host country exceeds the disadvantage of a lower degree of purchasing power in the host country. The return probability increases over time because accumulated savings steadily increase and approach the planned amount. After retirement the advantage of a positive wage differential in the host country disappears and becomes irrelevant, so that a person, being retired, faces only the differential of purchasing power.

By studying comparative statics, it firstly becomes clear that an exogenous increase of purchasing power at home and of accumulated savings respectively increase the passed time at home. By holding wage in the host country  $w^*$  constant, furthermore, an exogenous increase of wage  $w$  at home reduces the wage differential and thus reduces the relative costs of one time unit, that is spent at home. So if spending time at home is considered as a normal good, the immigrant will like to spend more working time at home and less in the host country.

However, an exogenous increase of wage  $w^*$  is followed both by a substitution effect and by an income effect and thus realizes an ambiguous effect. An increased wage  $w^*$  in the host country and an increased wage differential ( $w^* > w$ ) raises opportunity costs of return migration that reduces the demand after spending time at home (substitution effect). However, a greater wage  $w^*$  has simultaneously the consequence that a given amount of accumulated savings can be afforded quicker. This income effect raises, on the contrary, the demand of spending time at home and reduces the

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<sup>1</sup>On contrary to classical guest worker models (Djajic, 1989; Hill, 1987), the possibility of choosing the daily working time and the working volume is excluded. Due to simplifying aims, it is also assumed that the bundle of untradable goods of individual  $i$  equals in both countries (Cobb-Clark and Stillman, 2013). Hence this is a static model without any uncertainties about wages, prices, consumption and the time of death  $t = 1$ .

duration of residence in the host country (Djajic and Milbourne, 1988).

Taking this life cycle model as an initial point for the econometric analysis, there can be asked a wide range of different research questions. The impact of an exogenous increase of wage  $w^*$  in the host country as one first empirical question has raised interest by different economists. Kirdar (2007) has found a domination of the income effect by using a stratified Cox hazard model and data of GSOEP from 1984 to 2000. Dustmann (2001) has detected an U-shaped link between wage in the host country and duration of residence with data from GSOEP from 1984 to 1997. His study shows that an increase of wage  $w^*$  raises the duration of residence in the sector of low wages and reduces years of residence, when immigrants with high wages are considered.

In the life cycle model of Migration Economics the interest lies not only on the wage effect, but rather more on the impact of retirement behavior and age. By using data of GSOEP from 1984 to 1997, Constant and Massey (2003) find that the return probability raises by approaching the official retirement age (see also Gundel and Peters, 2008a, 2008b). Kirdar (2007) has found that the return probability of Turkish immigrants decrease from an initial high probability until a minimum return probability is reached between 45 and 54 years and then raises again.

In spite of interesting research questions and the possibility of concentrating on economic variables, some critique should be uttered with regard to the life cycle model of Migration Economics, that models return choices in a rather individualistic and isolated frame. If the bundle of goods is assumed to be fix, a lower price level and a higher purchasing power at home will realize a higher utility at home than in the host country at each point in time. Thus, return migration occurs optimally at last, when individual  $i$  retires because from the point in time of retirement the wage advantage in the host country disappears in the migration decision. Only if the assumption of a higher purchasing power at home is relaxed, the model will allow permanent immigration. But as we can observe permanent immigration in reality, factors like societal integration and cultural factors like feelings of belonging have to be considered deeper.

## **2.2 The human capital hypothesis and theories of labor market integration**

The selection model of Borjas and Bratsberg (1996) introduces the impacts of education and qualification on migration behavior. The authors show that average characteristics of newly immigrating persons influence the return decision of already immigrated individuals.

Different compositions of qualification between immigrants and re-emigrants depend on the proportion of home wage that can be traced back to own skills and this proportion differs between the two countries. Analogously to Borjas and Bratsberg (1996), positive selection will follow if mainly under-averagely qualified migrants re-emigrate and the immigration flow consists of over-averagely qualified immigrants. Then highly qualified immigrants draw greater utility of staying in the host country in spite of the accumulation of human capital in the host country that may result in a higher wage at home after realized return migration. By contrast, averagely under-qualified migrants decide to return and use the collected human capital after realized

return migration at home. Particularly the selection model of Borjas and Bratsberg (1996) intricates that not only the success of immigrants determines the migration behavior, but rather the degree of qualification may dominate the effect of labor market performance. So someone cannot claim for sure that always the immigrants with a bad labor market performance return more likely than successful immigrants.

Outgoing from the selection model by Borjas and Bratsberg (1996), the literature of return migration firstly has analyzed the selection process, whereas there was a focusing on the question how the return migration flow is decomposed by the degree of qualification. By using a random-effects probit model and a Cox estimation, Gundel and Peters (2008a, 2008b) find hints on negative selection. Dustmann and Kirchkamp (2002) confirm this result by using survey data of the Institute for Employment Research (IAB).

Secondly, the model of Borjas and Bratsberg (1996) bases on the human capital thesis that extends the life cycle model of Migration Economics. The central assumption is that working experience in a highly industrialized host country raises the productivity of immigrant  $i$  in the home country and thus exceeds the productivity of a worker from the same country of origin that displays the same characteristics except that she has worked the whole life in the country of origin and has never moved to a foreign country. Recently the European Commission has begun to use return migration, meaning the collection of human capital during a temporary stay in the host country and a later return back to the home country, as an instrument of development aid. Following this and in the context of the human capital hypothesis, the interaction between labor market integration needs to be investigated deeper, because return migration can only be a possible instrument of development policy, if highly qualified immigrants from developing countries return home more likely, even if she is well integrated into the labor market.

The third important research question is the often named suspicion of social abuse by immigrants. The return migration literature supplies a rather uniformly opinion towards this question. Constant and Massey (2003) for instance find a positive selection mechanism considering the variable of obtaining social benefits with data of GSOEP from 1984 to 1997. Pohl (2008) has found that a foreign-born welfare recipient *ceteris paribus* displays a higher return probability that supports the thesis whereupon economic inactive immigrants are more mobile than employed immigrants (see also Sander, 2007). However, the return probability decreases, when only welfare recipients are considered which home country is outside of EU. In the study of Kirdar (2007) the selection mechanism depends on the duration of unemployment. Immigrants, that are unemployed less than one year, display a significantly higher probability of return migration, whereas immigrants, that are unemployed for a longer time, stay longer in Germany. Thus, the link between labor market integration, location of the home country and duration of unemployment affects adverse selection and needs to be considered deeper.

To put in nutshell, it can be noted that the selection process is a conditional phenomenon that depends on age, on the duration of unemployment and on the geographical and political localization of the home country. Furthermore, by applying non-proportional Cox estimations and modeling time-varying effects, it can be an-

alyzed how effects of qualification, of labor market performance and of obtaining social benefits depend on the duration of residence. This will supply new facts and circumstances with wide-reaching policy implications.

The empirical analysis will consider further variables of labor market integration and moreover, variables of societal integration, for instance German language skills and cultural identities. Constant and Massey (2003) for instance show empirically that guest-workers with strong cultural connections to Germany return more seldom towards the home country. German language skills as well reduce the intention to re-emigrate (Dustmann, 1999; Sander, 2007; Gundel and Peters, 2008a).

An important question will be also the impact of possessing the German citizenship that may raise ambiguous effects. On the one hand, attaining the German citizenship could reflect a better societal integration. Constant and Massey (2003) get a significantly negative effect of German citizenships on the probability of return migration in a multinomial logit model. On the other hand, the possession of a German citizenship may facilitate repeated emigration and immigration and thus stimulates circular migration, a thesis, that was shown by Constant and Zimmermann (2011) by applying a Count Data Model, counting the number of exits from Germany.<sup>2</sup> In the paper of Holst et al. (2008) immigrants, possessing a German citizenship, send significantly more money back to the home country. However, these higher remittances may be due to compensation of guilt pangs or past debts to the own family that have supported the family member when he has immigrated to Germany.

## 2.3 Hypotheses of discrimination

Discrimination, defined as being disadvantaged due to origin and ethnic features, affects intrinsically satisfaction and life feeling of individuals as well as financial costs for an economy emerges. Discrimination impedes an optimal job matching and restrains productivity and the motivation and effort of a worker (Uslucan and Yalcin, 2012). Nevertheless discrimination has been barely investigated empirically related to return migration and remittances. To my knowledge a theoretical fundament, that introduces the impact of discrimination on migration behavior, has not been edited by any economist, yet (Holst et al., 2008).

Initial hypothesis is the supposition, whereas highly qualified and well remunerated immigrants, that feel discriminated, re-emigrate more likely than immigrants that are less qualified and less well integrated into the labor market, given the same level and intensity of discrimination. Consistently to the pyramid of needs of Maslow (1954), part of modern motivation theory, whereas individual  $i$  satisfies firstly her physiological needs and needs of security, the same level of discrimination can spread different consequences for the individual behavior (see Dülfer and Jöstingmeier, 2008). The effect of a given level of discrimination depends on employment status, on degree of qualification and on salary. Once as the two basic kinds of needs, namely secured existence (physiological needs) and appropriate working conditions and job security (needs of security) are fulfilled, the individual considers also social needs, needs of appreciation and finally needs of self-fulfillment. Conse-

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<sup>2</sup>The model of Hill (1987) may support this result by theoretical considerations. The utility function of an immigrant may depend negatively on the time span between repeated immigration into the host country and the last visit at home.



quently, a fixed degree of discrimination for all five tiers does not affect migration behavior in the two lower tiers. However, after the immigrant is able to fulfill her physiological needs and her needs of security, the effect of discrimination increases when the individual faces tier three and four, for instance facing relations to colleagues, friends and neighbours and a hoped appreciation at work place. Thus, an immigrant, that faces tier three and four, does not evaluate an appropriate salary as importantly, but rather ranks appreciation, group affiliation and social prestige highly in her mind. But if the individual does not feel for instance enough recognition and feels discriminated, this will increase her return probability, depending on employment status and on the degree of qualification and education.

Consistently to this supposition, Constant and Massey (2003) find that guest-worker with a higher value in the Treiman International Occupational Prestige Scala display a significantly lower return probability. However, disadvantages due to origin, never have been explicitly investigated empirically in the topic of return migration.

### 3 Econometric method and data

#### 3.1 Econometric method

To investigate the determinants of return migration, applying the Cox hazard model is senseful. Models of survival analysis show how covariates affect the probability that the interesting event occurs to individual  $i$  at a specific point in time. In this paper the event is impressed by the binary variable  $y_{it}$  that takes the value of 1 when individual  $i$  returns to the home country at next period  $t+1$  (see section 3.2). With regard to this binary and non-metric scaled variable and to avoid problems of heteroskedasticity, applying a linear regression model would be a weak approach. Cox estimation, as a semiparametric and very flexible approach, allows modeling time-constant and time-varying covariates as well as the specific form of time dependance does not have to be assumed priorly. So it does not oblige any assumption about the functional form of the baseline hazard  $h_0(t)$ . However, the approximation of the baseline hazard and the graphic illustration of hazard functions and survivor functions with regard to a specific covariate constellation is nevertheless possible. Moreover, the Cox hazard model is able to model variables with time-varying and non-proportional effects. In detail, the strength of effect of an exogenous variable may change during the duration of the process. This will supply new and important circumstances for Migration Economics, particularly when effects of adverse selection are considered in dependance of the duration of residence.

Exogenous variables  $x_1, x_2, \dots, x_k$  enter linearly in equation (1) and have multiplicative impacts on the baseline hazard. The hazard ratio  $h(t)$  is the probability that individual  $i$  returns to the home country at time  $t+1$ , if the return migration has not occurred till point in time  $t+1$ . The hazard ratio changes with factor  $\exp(\beta)$ , when the inset of exogenous variable  $x_k$  increases by one unit.

$$h(t) = h_0(t)\exp(\beta_1x_1 + \beta_2x_2 + \dots + \beta_kx_k) \quad (1)$$

An important feature of the Cox hazard model as a semiparametric concept is the application of a partial likelihood function. According to the concept of partial likelihood functions not only the exact point in time of the event is relevant, but rather

more the ordering of the observations according to the waiting-time. In other duration models every single observation contributes an independent information to the likelihood, but the partial likelihood results from single contributions of that cases, that actually experience an event. However, the observations that do not occur an event are nevertheless part of the calculation of the partial likelihood function, namely in the risk set. The Cox hazard model as the applied method requires the choice of a waiting-time concept. Consistently to Kirdar (2007) and Gundel and Peters (2008a), this will be the duration of residence. Thus, the probability of return migration can be estimated for every year of residence, depending on explaining variables of immigrant  $i$ .

The basic form of the Cox hazard model is a proportional form. The assumption of a proportional impact of the regressors is central and has to be tested for every single covariate. Proportionality means that the hazard ratio of an exogenous variable and its strength of effect have to be constant for the whole duration. In case of failure of this assumption, there are several solution concepts.

One possibility is to model manually a non-proportional effect for the affected covariate and indicate how exactly the regressor interacts with waiting-time. This approach is an advantage of the Cox hazard model and is often used in cases of metric-scaled variables.

Another concept of solution is stratification that is often applied in cases of categorical variables. Firstly, this approach separates the dataset into different groups or categories due to the coding of the considered covariate. Facing for instance a variable  $x_1$ , that is binary, the basic form of Cox estimation is stratified into two estimation equations according to variable  $x_1$  with characteristics of either 1 or 0:

$$h(t) = \begin{cases} h_{01}(t) \exp(\beta_2 x_2 + \beta_3 x_3 + \dots + \beta_k x_k) & \text{if } x_1 = 1 \\ h_{02}(t) \exp(\beta_2 x_2 + \beta_3 x_3 + \dots + \beta_k x_k) & \text{if } x_1 = 0 \end{cases} \quad (2)$$

The baseline hazard distinguishes between the two groups, but the estimation coefficients  $\beta_k$  does not distinguish between the two categories. In consequence, in spite of the separation, the Cox model still estimates respectively only one hazard ratio for the covariates  $x_2, \dots, x_k$ . However, the estimation of the hazard ratio of the stratified variable is unfortunately no longer feasible. So, if there lies special interest on the impact of one covariate with a non-proportional effect on the return probability, the first explained solution can either be applied in the case of categorical variables.

When ties occur, there are cases that experience an event at the same point in time of the process. This requires a correction. In application of the exact marginal calculation, ties with the same point in time of return migration afford a mutual contribution to partial likelihood. The used correction method for ties is an approximation of the exact marginal calculation.

In consequence of the panel character of the German Socio-Economic Panel (GSOEP), the existence of right censored and left truncated data needs to be mentioned. Right censoring occurs, when an immigrant has the chance to return to the home country even after the end of the observation period. The Cox hazard model takes this into account. The event may not occur till the last year of observation, but individual  $i$  was nevertheless exposed to the risk of return migration and thus, enters contributions into the risk set of the partial likelihood and was taken into account

in the estimation process. Left truncated observations occur, when individual  $i$  was exposed to the risk of an event, even before data was collected. So there are individuals that return to their home country, even before they have the chance to become a part of the GSOEP.

All the points which were discussed in this section are going to be tackled in detail later on after the results have been presented. But for now section 3 will be concluded by considering the used longitudinal dataset. This includes a closer look on how the different hypotheses from section 2 are tested empirically.

### 3.2 Data and descriptive statistics

The German Socio-Economic Panel (GSOEP) is annually conducted since 1984 and collects diverse information about socio-economic characteristics by sampling households and persons living in Germany (Göbel et al., 2008). The empirical analysis takes account of sample B, D and F. Wave B questioned foreigners in West-Germany primarily in 1984, the immigration sample D started in 1994/95 and wave F refreshed the proportion of immigrants since 2000. The biggest proportion of observations counts to wave B that consists exclusively of persons originated from classical guest-worker nations (Greece, Italy, Spain, Turkey and (Ex-)Yugoslavia). However, waves D and F are not limited to those nationalities.

The endogenous variable  $y_{it}$  is constructed through sampled reasons for a final drop-out out of the panel. The most frequent reasons for a ultimate drop-out are death and emigration. As the country, the individual  $i$  emigrates to, is not listed, it is assumed that this equals the home country. The information of actual emigration, which is recorded for the following year after the last successful inquiry of individual  $i$ , is combined in a next step with the last successful questioning of individual  $i$  in the previous period.<sup>3</sup> Thus, if it is recorded that individual  $i$  emigrates at  $t+1$ , this information will be combined with the last successful year of questioning in  $t$ . So the endogenous variable  $y_{it}$  will take value 1 at time  $t$  if individual  $i$  returns to his home country in the next period  $t+1$ . If individual  $i$  stays in the next period  $t+1$ ,  $y_{it}$  will take value 0 at time  $t$ :

$$y_{it} = \begin{cases} 1 & \text{if individual } i \text{ returns in the next period } t+1 \\ 0 & \text{otherwise} \end{cases} \quad (3)$$

Hence, actual return migration is considered and distortions due to systematic differences between planned and actual duration of residence are avoided (see also van den Berg and Weynandt, 2012). Due to the construction of  $y_{it}$ , the observation period has to end up in 2011 because actual return decisions can only be observed one period later and there has not been observations of year 2013.

After having explained the construction of  $y_{it}$ , there are some further restrictions on the dataset of GSOEP that have to be done. First of all, the empirical analysis only includes first-generation immigrants. Thus, all persons, who were born in Germany,

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<sup>3</sup>The extent of return migration is underestimated by the kind of construction of  $y_{it}$  because people that drop out of the panel because of reasons like 'finally denied' or 'address, household not trackable' could just have emigrated either (Gundel and Peters, 2008b).

are excluded from the analysis. Furthermore, immigrants younger than 18 years, are excluded because migration decisions of a child or a teen can seldom be voluntary and individual (Gundel and Peters, 2008b).

As a third restriction, the data exclusively considers West-Germany. Different structures of return migration behavior between new and old federal states should be excluded because an area specific impact is not interesting here.

Finally the dataset is limited on the observation period from 1996 until 2011. On the one hand this restriction is a result of the handicap of GSOEP that samples important variables of labor market integration and migration-specific variables like discrimination and remittances only since 1996. Moreover, this narrow time period avoids any impact of the implementation of return programs in the 1980s. There is no interest in the influence of these programs and moreover, the impact of these policy interventions has been rather short-term.

Having done these restrictions, there remains 23,584 observations over 2,811 individuals, whereas 321 re-migrants are sampled, which equals a proportion of 11.4% re-migrants.<sup>4</sup> Considering the fourth and last column of table 1, it becomes clear that in consistence to migration trends of Germany, the extent of return migration has been decreasing in the last years in the sample, too.

**Table 1.** The distribution of observed return migration over time

Year	Number of observations	Number of re-migrants	Share of annual return migration in total amount of return migration (in %)
1996	2,189	35	10.9
1997	2,072	48	15.0
1998	1,880	31	9.7
1999	1,744	32	10.0
2000	1,866	30	9.3
2001	1,797	18	5.6
2002	1,661	14	4.4
2003	1,575	22	6.9
2004	1,501	11	3.4
2005	1,424	13	4.0
2006	1,286	11	3.4
2007	1,172	21	6.5
2008	1,046	15	4.7
2009	898	11	3.4
2010	780	7	2.2
2011	693	2	0.6
$\Sigma$	23,584	321	100.0

Source: GSOEP, own calculations

Table 2 presents differences between the two groups of immigrants and re-migrants with regard to descriptive statistics that subdivide used covariates into the categories of socio-demographic variables (including the variables of life cycle model, namely age and wage), variables of labor market and geography and variables of societal integration. First of all, it strikes that re-emigrates are on average 4.5 years older than immigrants because of a bigger proportion of over-60s and of

<sup>4</sup>This proportion is comparable with prior studies analysing the return migration behavior of immigrants (Kirdar, 2007; Gundel and Peters, 2008a, 2008b).

**Table 2.** Descriptive Statistics

Exogenous variables	Immigrants	Re-migrants
<b>Life-cycle model &amp; socio-demography</b>		
Age	45.2	49.7
Age 18 to 29 years (in %)	15.6	15.9
Age 30 to 39 years (in %)	24.3	17.8
Age 40 to 49 years (in %)	21.1	10.9
Age 50 to 59 years (in %)	20.0	14.3
Age $\geq 60$ years (in %)	19.0	41.1
Obtaining old-age pension (in %)	15.4	27.4
Weekly wage (in €)	328.9	291.2
Years of residence	22.0	22.4
Duration of residence, 0 to 5 years (in %)	4.4	14.3
Male sex (in %)	50.2	53.0
Relationship status (in %)	82.2	75.4
Spouse in country of origin (in %)	0.2	2.5
Children in household (in %)	42.8	31.5
<b>Labor market &amp; geography</b>		
Full-time employed (in %)	41.7	25.6
Cumulative years of unemployment	1.4	1.9
Obtaining social benefits (in %)	15.1	23.4
High education, ISCED 5–6 (in %)	11.7	10.9
Middle education, ISCED 3–4 (in %)	41.5	30.2
Low education, ISCED 1–2 (in %)	42.1	55.1
Member of EU (in %)	28.4	46.1
<b>Societal integration</b>		
German language skills (in %)	47.2	27.7
German citizenship (in %)	33.0	7.8
Double citizenship (in %)	4.1	0.9
Discriminated due to origin (in %)	6.2	10.0
Remittances (in %)	8.6	11.8
Number of observations	23,263	321
	$\Sigma = 23,584$	
Individuals	2,490	321
	$\Sigma = 2,811$	
Share of re-migrants	11.42%	

Source: GSOEP, own calculations

pensioners. Moreover migrants, being in the best ages of capacity to work between the age of 40 and 59, apparently emigrate rarely. This indicates validity of the life cycle model and an U-shaped link between age and the probability of return migration. Thus, proceeding from a high probability of re-emigration of the youngest age group, the probability decreases during the best age of capacity to work and then increases again, converging to the official retirement age.<sup>5</sup> Considering the second central variable in the life cycle model of Migration Economics, namely the wage,

<sup>5</sup>Till October 2013 only persons from another state of EU or from a state, that have subscribed a bilateral agreement on social insurance with Germany, can obtain payments of the German old-age pension without any cut-backs after the emigration. This may distort migration behavior of immigrants, that are willing to emigrate to a third country, where immigrants have to fear cut-backs.

there can only be detected a slight wage advantage for immigrants of about 37.7€ per week.<sup>6</sup>

To accentuate a household specific context with regard to the decision of return migration, the questions, whether the person has a marriage partner in the home country and whether there live children in the faced household in Germany, will be considered either.

Dedicating to further variables of labor market, re-emigrants are having on average less chances of getting a full-time job. Consistently, the share of migrants, obtaining social benefits from unemployment insurance, unemployment assistance or social assistance, is bigger in the group of re-migrants and re-migrants' (cumulative) duration of unemployment is also longer than that of all immigrants.

Considering education and qualification with regard to the ISCED classification of 1997, the majority of re-emigrants can be matched to the group of low education with 55.1%, whereas the proportion of 11.7% of high educated migrants is slightly bigger in the group of immigrants. The variables of education and qualification will be in the center of attention in the empirical analysis. On the one hand, an important aim of German migration policy is to attract highly qualified and highly educated migrants to the German labor market to disburden old-age pension system. On the other hand, a temporary residence and, hence, the possibility of collecting labor market experiences in a highly industrialized country like Germany and a final return to home during working life, stimulates the economic development of developing countries. The same can be said about return migration of young immigrants after graduation. This so called human capital thesis can be part of a senseful development aid and will be tested econometrically either.

Consistently with uttered expectations from section 2, the group of re-emigrants consists of a surpassing proportion of migrants from other states of the EU. Apparently free movement of workers, the non-existence of border controls, lower distance and similar attitudes towards life and risk promote a higher labor mobility.

The following empirical analysis will also test possible macroeconomic impacts on migration behavior. For this purpose, annual economic growth in the home country and unemployment rates in the home country (after the definition of ILO) from the dataset of Worldbank are respectively matched to the home country of individual  $i$ .<sup>7</sup> Both variables pay attention to the suggestion that return migration becomes more likely in consequence of a positive economic and political development at home. This is for instance supposed for migrants with Turkish roots, following an economic boom in the 1990s. The annual economic growth in Turkey of about 4.3% between 1996 and 2011 is on average greater than the average of the German growth rate of 1.4% during the same period.

With regard the indicators of societal integration, re-emigrants owe averagely less likely the German citizenship, have less likely (very) well German writing or speaking skills and are more frequently discriminated because of their origin. The binary

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<sup>6</sup>By using the equivalence labor market income of households with respect to the modified equivalence scale of OECD and assuming a constant income over year, the weekly wage was constructed. Furthermore, the consumer price index due to base year 2006 was used to construct wages on real terms and avoid any distortions with respect to inflation. Note, that it was refrained to construct hourly wage because of a certain amount of missing value in the information about weeks worked.

<sup>7</sup>Both variables are left out of table 2 due to comprehensible reasons.

variable of discrimination equals 1, if the immigrant feels often or very often disadvantaged due to her origin or ethnic features.<sup>8</sup> The difference of proportion of discrimination is not as big as expected. Unfortunately, this variable of discrimination is the only suitable variable, sampled in the GSOEP, that takes account of discrimination. Different forms of discrimination have not been taken into account, yet. Moreover, variables of societal integration and ethnic identity like feelings of belonging, feelings of homelessness and contact with German citizens may be intriguing impacts of migration behavior. However, these variables have only been listed rather sporadically and unfrequently by the GSOEP.

Finally, table 2 records whether individual  $i$  has sent remittances in the preceding year to own children, to parents or to a spouse, living in the home country. Due to rather low difference in percentage points in table 2, some doubts may arise, whether remittances are a good predictor of return migration plans like Constant and Massey (2003) and Gundel and Peters (2008a) express. However, by comparing the amounts of remittances in real prices to base year 2006, which are not explicitly recorded in table 2, there are indeed substantial differences between the two groups. Conditional on having sent any remittances the average amount of remittances of immigrants and re-emigrants are respectively approximately 1,704.03€ and 2,264.50€. Generally notable are, moreover, the per se high values of sent remittances. Albeit the averagely proportion of 8.6% of migrants, having sent remittances to relatives in the home country, is low, the averagely amount will be rather high, if remittances are indeed sent.

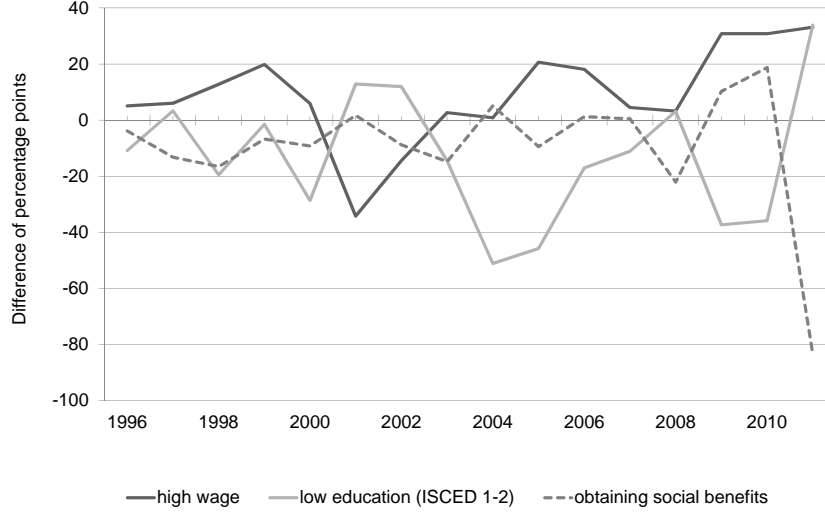
Table 2 gives a first impression of used variables and structural differences between immigrants and re-emigrants. However, the static distinguishing of observations between immigrants and re-emigrants of table 2 has the consequence that a lot of information get lost. This is illustrated in figure 1. Considering the variable of obtaining social benefits for instance, table 2 displays a great difference of -8.3 percentage points between these two groups, that reasons the expectation, that obtaining social benefits enhances the probability of return migration. However, considering this difference now over time in figure 1, it can be noted that this difference is not stable and there are periods, in which the proportion of obtaining social benefits is even bigger in the group of immigrants than in the group of re-emigrants. Although these observations over time can be somehow explained by economic shocks and weak economic cycle, the necessity of an econometric estimation becomes clear here.

Similar conclusions can be drawn about the binary variables of low education, obtaining a high weekly wage, meaning an weekly wage of at least 450€ and about some other variables, not depicted in figure 1 like the feeling of been discriminated because of the origin. There are of course a lot of variables which confirm the observations of table 2 in the time comparison, either. However, figure 1 clarifies that this suspicion does not hold for all variables and a time dependant panel-analysis with an econometric estimation is necessary to derive policy implications.<sup>9</sup>

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<sup>8</sup>Until 2013 GSOEP does not distinguish between different forms and areas of discrimination and is, thus, defined rather generally, and a distinction between discrimination at work, at government offices and agencies or at the police and other areas could not be undertaken.

<sup>9</sup>Note, moreover, that the averages of re-migrants in table 2 are based only on 321 observations that conform with the observations of the last successful year of inquiry before return migration. This makes an econometric analysis is essential even more.



**Fig. 1.** Immigrants and re-migrants: Differences in composition over time  
Source: GSOEP, own calculations

## 4 Baseline empirical results

Each estimation of section 4 and 5 explains the binary indicator of return migration  $y_{it}$  by applying the Cox hazard model. The applied correction method for ties in each presented estimation is an approximation of exact marginal calculation, namely the method of Breslow (Cleves et al., 2010). The use of duration of residence as the waiting-time concept and the observation period from 1996 till 2011 is also fixed. The proportional assumption is tested for the whole (global) model by the link test as well as the assumption is tested for each covariate additionally by the Schoenfeld test (Grambsch and Therneau, 1994). Both specifications of table 3 base on the presented data set with 23,544 observations, 2,808 individuals and a realization of 317 cases of return migration. If non-proportional effects are detected considering for instance one variable, I let this variable interact with the duration of residence, known as the waiting-time concept (Windzio, 2013). The following part explains the interpretation of the variables with non-linear effects.

Considering estimated specification 1 at first, the expected U-shaped link between age and return probability, consistently with the life cycle model of Migration Economics, is verified by using the metric-scaled variable of age and its quadratic term. The significant hazard ratios of age lower than 1 and of its quadratic term above 1 show that the probability of return migration decreases apriori from a high initial probability and afterwards increases by approaching the official retirement age. By calculating the coefficients of age and of its quadratic term, it becomes clear, that outgoing from a high level, the probability of return migration firstly decreases by 9.3% each year and then starts to increase, once an age of 59.2 years is reached (Cleves et al., 2010). Remarkably, the return probability starts increasing already with approaching the official retirement age.



**Table 3.** Cox hazard estimation of return migration  $y_{it}$  from 1996-2011

Exogenous variables	(1)		(2)	
	Hazard ratio	Std. error	Hazard ratio	Std. error
Life cycle mode & socio-demography				
Age	0.907***	0.023	0.914***	0.022
Age squared	1.0008***	0.0003	1.0008***	0.0002
Weekly wage	0.968**	0.015	0.961**	0.015
Relationship status	0.809	0.126	0.831	0.124
Male sex	1.104	0.137		
Spouse in country of origin	3.620***	1.511	3.549***	1.467
Children in household	0.985	0.144		
Labor market & geography				
Full-time employed	0.535***	0.084	0.556***	0.089
Cumulative duration of unemployment	1.043**	0.021	1.042**	0.020
Obtaining social benefits	2.626***	0.697		
Obtaining social benefits*employed			1.629*	0.464
High education	5.342***	1.838		
High education*employed			2.524***	0.639
Low education	0.569**	0.153		
Low education*employed			0.746	0.139
Member of EU	1.531***	0.189	1.541***	0.188
Societal integration				
Discriminated*high education	0.662	0.358	1.111	0.585
German citizenship	0.320***	0.076	0.316***	0.074
Double citizenship	1.118	0.691	1.173	0.724
German language skills	0.456***	0.061	0.436***	0.058
Remittances	2.681***	0.525	2.787***	0.547
tvc (obtaining social benefits)	0.965***	0.011		
tvc (high education)	0.950***	0.018		
tvc (low education)	1.028***	0.011		
Stratification				
Number of observations	23,544		23,544	
Individuals	2,808		2,808	
Cases of return migration	317		317	
Log likelihood	-2,136.3523		-2,152.3614	
LR $\chi^2$	227.19***		195.17***	
Notification: *significant at 10%, **significant at 5%, ***significant at 1%				
Source: GSOEP, own illustration				

Surprisingly, the binary variables of being in a relationship and having children in the household are not significant considering all common levels of significance. The same stands for sex. However, immigrants with a close connection to their home country re-emigrate more likely. Both having a spouse in the country of origin and sending remittances have an increasing effect on the return probability. This is consistent with literature which often takes remittances as an indicator of return migration plans.

Due to a right-skewness of weekly wages, this variable enters as the natural logarithm in all estimations. Considering the whole wage distribution in the first estimation, the logarithmized weekly wage does display a significant substitution effect so that a wage increase decreases the return probability. This domination of the substitution effect can be reasoned by the right-skewed wage distribution. An appropriate in-

strument to investigate a possible U-shaped link between wage and return migration behavior is the separation of the dataset in a high wage and a low wage group (see section 5.3).

The other variables of labor market integration show important facts as well. An immigrant, having a full-time job, displays a 46.5% lower return probability than an immigrant without a job of this kind. Moreover, immigrants, who locate themselves (cumulative) longer in the state of unemployment, also display a significant higher probability of returning to the home country.

Dedicating now to two central research questions, namely the impacts of education and of obtaining social benefits, it becomes clear that modeling time-varying effects supplies new and intriguing facts about migration behavior. At first, obtaining social benefits significantly increases on average the return probability at the beginning of the immigrant's residence by a factor of 2.6, whereas this high probability decreases with continuing his residence by a factor of 0.965 each period. Thus, social benefits cannot be interpreted as an incentive for a longer residence, when we consider time shortly after the immigration. The proposition of abusing the welfare state, meaning that immigrants immigrate to Germany to exploit the generous level of social benefits and the German welfare state, can at least be doubted. However, this effect mitigates by advancing years of residence. The effect of obtaining social benefits depends on duration of residence and moreover, on time of unemployment. It can be shown that obtaining social benefits makes return migration more likely and increases the hazard ratio to approximately 4.5, if the averagely immigrant's cumulative duration of unemployment falls below one year (see table A.1 in the appendix). By contrast, considering immigrants, who obtain social benefits and display a longer cumulative time of unemployment than two years, there cannot be found any significant effect.

Considering effects of education, it can be noted that highly qualified immigrants exhibit a very high and significant hazard ratio of 5.3 in relation to middle qualified immigrants, which, however, significantly decreases by about 5% each year of residence. Thus, highly qualified immigrants demonstrate a very high probability of return migration, especially in the first years after immigration. On the contrary, low qualified immigrants return significantly less likely to their home country in relation to reference group of middle qualified immigrants. Note that this low hazard ratio increases with increasing years of residence in relation to the first period after immigration and thus, this effect decreases with progress of residence. Modeling low qualified immigrants as the reference group, the portion with a high qualification still has a significant greater return probability, whereas there cannot be remarked any significance for middle qualified immigrants. By using the variance inflation factor, it becomes clear that there is no problem of multicollinearity in any specification of table 3. The observed effects do not change when the weekly wage is excluded from the Cox estimation.

The observations about skill composition, uttered in section 3, whereas the stock of remigration consists majoritarian of low qualified immigrants, can be refuted by the econometric investigation. An over-averagely return migration of highly qualified immigrants is consistent with the human capital thesis and the expectation, whereas a temporary stay in Germany and a later return to the home labor market, may be an important part of development aid for developing home countries. However, to investigate the efficiency of return migration as an instrument of development policy,

we have to analyze, whether an immigrant still returns home more likely, even if she is well integrated into the labor market. This will be done in section 5.1.

Immigrants from other countries of European Union have indeed a distinct higher probability of returning to the home country. Individuals from other states of EU have a 53.1% higher return risk in relation to immigrants whose home country is not current part of EU. Due to the elimination of travel restrictions and existence of free movement of workers, this result matches the expectations taken in section 2 and 3 and furthermore, the wishes of European labor market policy for a higher worker mobility inside of EU.

Considering the variables of discrimination and societal integration, there cannot be proven any effects of discrimination. The variable of being discriminated as well as interaction terms with variables of labor market integration, for instance the binary variables of the status of employment, do not have any significant effects on the return probability. The suggestion, that the possession of the German citizenship strengthens the incentive of circular migration, cannot be proven as well. On the contrary, ownership of the German citizenship decreases the return probability by 68.0% relative to immigrants with a foreign citizenship. Having (very) well German writing or speaking skills as well let the probability significantly decrease by 54.4%. Thus, German language skills and the German citizenship are strong and important indicators of integration and long residences. Finally, the suggestion, whereupon the possession of a double citizenship fosters emigration, can be disproved.

## 5 Further investigations

### 5.1 The human capital hypothesis: the interaction between labor market performance and human capital

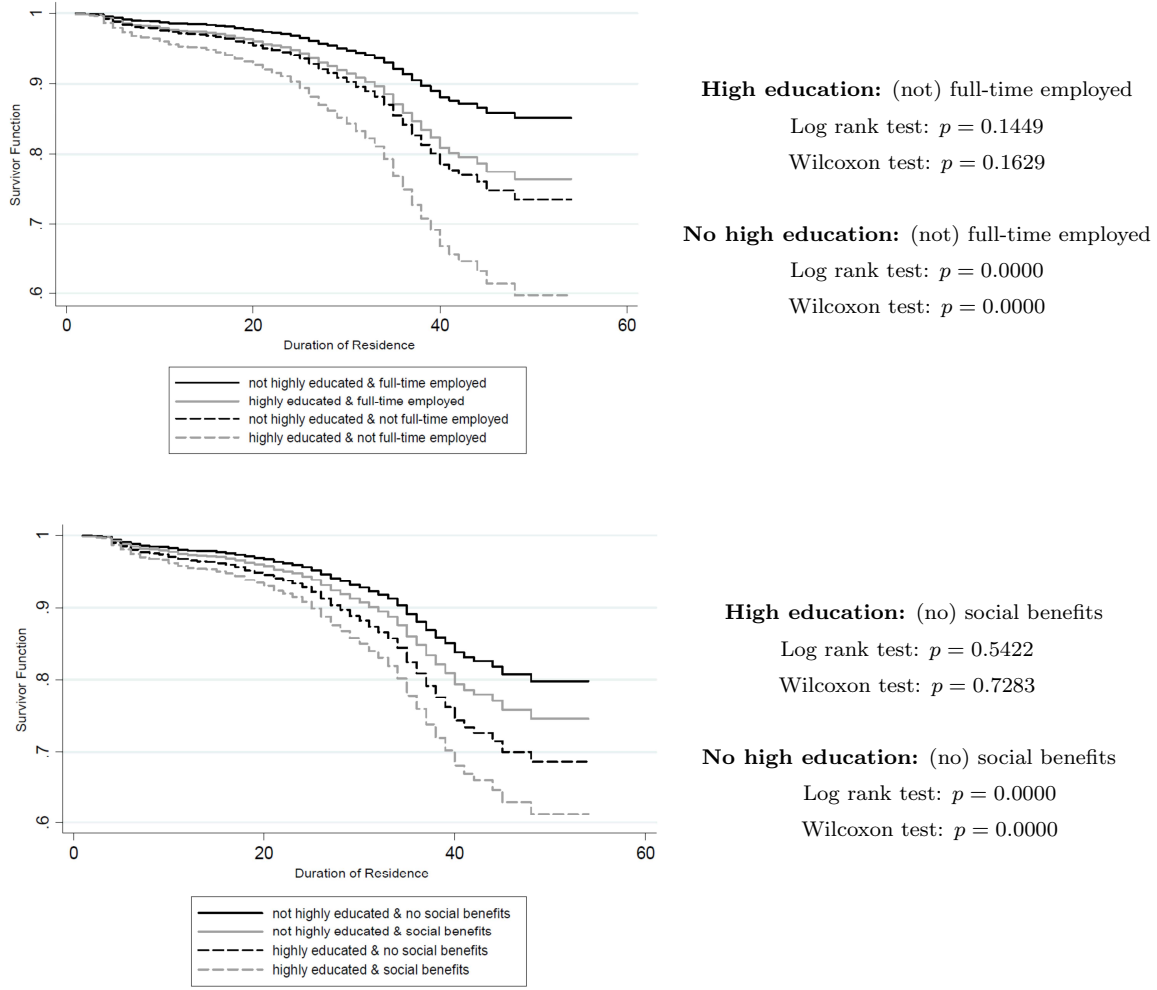
By visualizing the presented Cox estimation, the interaction between return decisions, education level and labor market integration of highly qualified immigrants should be accentuated one more time. This deeper investigation should answer the research question, whether those immigrants, that display a weak labor market performance, return more likely or whether this labor market integration effect depends, on the contrary, on the individual degree of qualification. Due to this sake, survivor functions are derived from the estimation of the Cox hazard model.<sup>10</sup> The presented survivor functions are derived from specification 2 of table 3. As specification 1 is a non-proportional Cox hazard estimation, the illustration of survivor functions is no longer possible. Thus, I use specification 2 for this sake.<sup>11</sup>

The p-values of log rank test and Wilcoxon test next to the illustrations of the survivor functions show, whether the different functions are statistical significant different from each other. Both tests check the equality of two or more groups for the whole process by comparing the expected and the actual amount of return migration cases for each possible duration of residence (Cleves et al., 2010).

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<sup>10</sup>Based on Gundel and Peters (2008a).

<sup>11</sup>Because the estimation results of this specification are robust, this is not a problem. Specification 2 is merely changed in the way that I let interact the education variables and the variable of obtaining social benefits respectively with the status of employment.



**Fig. 2.** Survivor functions: the link between education and labor market integration  
 (Source: GSOEP)

The upper panel of figure 2 illustrates the survivor function with regard to the variables of education and employment status. Thus, the functions differ depending on whether individual  $i$  records a high level of education or not and whether he owns a full-time job or not. The survivor function of immigrants with high education and simultaneously without a full-time job decreases most rapidly, meaning that this group apparently returns most likely and most rapidly. However, the two functions, namely the group with high education and without a full-time job and the group with high education and with a full-time job do not differ significantly from each other due to log rank test and Wilcoxon test. On the contrary, the survivor functions of the two groups respectively without high education do differ significantly. Thus, it seems that the employment status plays an important part in the return migration decision for immigrants with a low to middle degree of education. However, for highly qualified immigrants the role of the employment status is not that dominant. Thus, the outstanding high return probability of highly educated immigrants is independent of employment status and the education effect dominates the employment effect for this group.

The second interesting notation is, that during the whole process the proportion of

individuals, having not re-emigrated until a certain duration of residence, is about the same between immigrants that are highly educated and have a full-time job and immigrants that have neither of this. So a highly educated immigrant averagely records approximately the same return probability compared to an immigrant without a high degree of education and without a full-time job. This holds even though the person with the high degree of education does have a full-time job.

The results do not change when the indicator of labor market integration of full-time employment is replaced by a dummy of employment that equals 1 if individual  $i$  owns any employment.

The expressed results of the upper panel of figure 2 are also confirmed by the lower panel of the same figure which uses social benefits instead of employment status as the indicator of labor market integration. The education degree emerges again as the dominating effect and the effect of obtaining social benefits takes a backseat, considering highly qualified immigrants. On the contrary, obtaining social benefits impacts migration behavior of immigrants without a high education stronger.

Thus, it can be noted that highly qualified immigrants re-emigrate significantly more likely compared to immigrants with a middle or low education degree, regardless whether the highly educated immigrant is well integrated into the labor market or not. So a good labor market integration affects particularly the return decision of low and middle educated individuals.

Furthermore, the location of the home country does not have any effect in the group of middle and low educated immigrants, however, it does have an effect in the group of highly qualified immigrants (see figure A.1 in the appendix). The survivor functions of the two groups with high education do differ significantly from each other, resulting in an even bigger return probability of highly qualified immigrants, namely for the case if the individual was born in another country of EU. On the contrary, the return probability of low to middle educated immigrants does not depend on the area of origin.

## 5.2 Intrahousehold correlations and the impact of marcoeconomic developments

Prior estimations have ignored the fact that return decisions are rarely individual and isolated choices. Migration decisions are, however, rather often choices taken by the whole household and family with the consequence that several household members immigrate or emigrate at the same point in time or at shortly lagged points in time. This supposition can be justified by wishes for family ties as well as by common interests, lifestyles, similar risk aversions and life attitudes (Klein, 1992). Such group effects have not been investigated in detail in literature of return migration, yet. Merely Brecht and Brecht (1992) discuss explicitly the role of households in the context of return decisions, however, without testing this econometrically.

To take group effects and intrahousehold correlations into account, a Cox estimation with cluster-robust standard errors is applied. In spite of the importance of controlling for intrahousehold correlations, the estimation results in specification 3 in table 4 are fairly robust for the majority of variables. The empirical validity of an U-shaped link between the age and the return probability still holds. However, due to an ambiguous link between wage and return probability, weekly wage cannot

**Table 4.** Cox estimation with cluster-robust standard errors and the impact of macroeconomic developments

	(3)		(4)	
Exogenous variables	Hazard ratio	robust std. error	Hazard ratio	robust std. error
<b>Life cycle model &amp; socio-demography</b>				
Age	0.904***	0.021	0.899***	0.021
Age squared	1.0009***	0.0002	1.001***	0.0002
Weekly wage	0.969	0.021	0.970	0.022
Relationship status	0.817	0.146	0.829	0.149
Spouse in country of origin	3.807***	1.807	3.889***	1.782
<b>Labor market &amp; geography</b>				
Full-time employed	0.554***	0.0786	0.559***	0.079
Cumulative duration of unemployment	1.047**	0.024	1.049**	0.024
Obtaining social benefits	2.777***	0.889	2.377***	0.760
High education	5.002***	1.796	6.194***	2.149
Low education	0.578**	0.159	0.650	0.183
Member of EU	1.529***	0.248	1.613***	0.320
<b>Societal integration</b>				
Discriminated*high education	0.623	0.389	0.535	0.276
German citizenship	0.330***	0.092	0.352***	0.099
German language skills	0.464***	0.071	0.444***	0.068
Remittances				
<b>Marcoeconomic variables</b>				
Unemployment rate			1.048***	0.018
Economic growth			1.112***	0.026
tvc (obtaining social benefits)	0.963***	0.013	0.967**	0.013
tvc (high education)	0.953***	0.017	0.947***	0.017
tvc (low education)	1.026**	0.011	1.022*	0.011
tvc (economic growth)			0.997***	0.001
Stratification	Remittances		Remittances	
Number of observations	23,544		23,544	
Individuals	2,808		2,808	
Cases of return migration	317		317	
Cluster	1,625		1,625	
Log likelihood	-2,022.3997		-1,997.9107	
LR $\chi^2$	191.72***		239.64***	
Notification: *significant at 10%, **significant at 5%, ***significant at 1%				
Source: GSOEP, own illustration				

realize any significant impact in this case.

The variables of labor market integration, societal integration and discrimination show robustness and consistency with section 4. A full-time employment as well as (very) good German language skills still reduce the probability of return migration significantly clearly and a longer (cumulative) duration of unemployment makes return migration more likely. Moreover, highly educated immigrants and immigrants, obtaining social benefits, return more likely with a significant time-decreasing hazard ratio like before. Low qualified immigrants still return significantly less likely to their home country. This probability increases with increasing years of residence. Furthermore, immigrants, who are originated from another state of EU, still re-emigrate more likely.

To put in nutshell, there clearly exists an intrahousehold correlation, facing the return decision, whereas estimation results remain robust and consistently, the impact of wage excluded. Thus, controlling for intrahousehold correlations is relevant, at least with regard to the wage effect.

Another concern that needs to be tested is the claim that macroeconomic trends and developments in the country of origin are expected to affect the return migration behavior. Macroeconomic developments should especially affect the return migration decisions of low educated immigrants. This expectation is uttered due to the analysis of survivor functions in section 5.1 and due to the result that the migration behavior of low and middle qualified immigrants depend stronger on labor market integration than the behavior of highly qualified immigrants.

Specification 4 of table 4 also uses cluster-robust standard errors and, furthermore, includes annual economic growth and the unemployment rate in each home country. Following the tests of proportional effects, economic growth displays a non-proportional hazard ratio. If economic growth raises by 1%, return migration will be more likely by 11.2%. However, this effect decreases significantly by the factor 0.997 each year of residence. Surprisingly, a higher unemployment rate likewise makes return migration more likely. This result may be explained by the selection model of Borjas and Bratsberg (1996). Immigrants, that have collected labor market experience in Germany, might hope for an even greater income advantage after return migration, especially in times of high unemployment in the country of origin.<sup>12</sup> As expected, after controlling for macroeconomic effects, the significant less likely return migration probability of low qualified immigrants vanishes. Low qualified immigrants even do not display a significant impact on the outcome variable, when a proportional impact over the whole duration of residence is assumed. All other effects stay robust. Highly qualified immigrants or immigrants obtaining social benefits for instance return significantly more likely, whereas the initial hazard ratio of highly educated immigrants even increases to 6.2. The migration behavior of highly educated immigrants does not depend on their labor market integration and on the general economic situation. On the contrary, this cannot be said about low educated immigrants. They react to a more comfortable labor market integration and positive macroeconomic conditions in the home country. These results are in line with the main results of section 4 and the considerations of survivor functions in section 5.1. Thus, both social benefits and a low education do not limit or obstruct a high labor mobility.<sup>13</sup>

Furthermore, including country of origin fixed effects does not change this last presented specification and the results stay robust. This can be interpreted in the way that including macroeconomic growth in different countries of origin already takes the different origins of observed immigrants into account.

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<sup>12</sup>This result remains robust after adding the unemployment rate in Germany to the estimation.

<sup>13</sup>By distinguishing between the three different types of social benefits, namely unemployment benefits, unemployment assistance and social assistance, it becomes clear, that the high hazard ratio of general social benefits is mainly constituted by obtaining social assistance. This result is available from the author upon request.

### 5.3 The wage effect on migration behavior

In addition to age, the other important variable of life cycle model is weekly wage. Does an increase of wages in the host country make return migration more likely (income effect) or less likely (substitution effect)? Up to now a domination of the substitution effect was observed when the whole right-screwed wage distribution is considered in table 3. However, taking cluster-robust standard errors due to intra-household correlations into account, the significance of this wage effect disappears.

**Table 5.** Estimation results separated with regard to critical wage 450€ per week

Exogenous variables	(5)		(6)	
	Hazard ratio	robust std. error	Hazard ratio	robust std. error
<b>Life cycle model &amp; socio-demography</b>				
Age	0.906	0.056	0.912***	0.023
Age squared	1.001***	0.0006	1.0008***	0.0003
Weekly wage	10.915***	8.385	0.960*	0.022
Relationship status	0.403**	0.156	0.855	0.161
Spouse in country of origin			5.941***	3.024
<b>Labor market &amp; geography</b>				
Full-time Employed	0.596*	0.185	0.552***	0.093
Cumulative duration of unemployment	1.028	0.064	1.047*	0.026
Obtaining social benefits	3.970**	2.247	2.556***	0.851
High education	66.778***	73.666	1.003	0.385
Low education	0.795	0.235	0.587**	0.160
Member of EU	1.888*	0.729	1.443**	0.262
<b>Societal integration</b>				
Discriminated*high education			1.564	1.112
German citizenship	0.651	0.230		
German language skills			0.492***	0.084
Remittances	2.022	0.878		
tvc (obtaining social benefits)			0.960***	0.013
tvc (high education)	0.859**	0.052	1.028**	0.012
tvc (low education)				
tvc (Weekly wage)	0.936*	0.034		
Stratification	Spouse in country of origin		German citizenship	
	German language skills		Remittances	
Number of observations	6,229		17,315	
Individuals	1,314		2,535	
Cases of return migration	60		257	
Log likelihood	-251,53939		-1,521.9038	
LR $\chi^2$	8,187.75***		93.37***	

Notification: \*significant at 10%, \*\*significant at 5%, \*\*\*significant at 1%

Source: GSOEP, own illustration

To have a closer look at the weekly wage, the econometric estimation is separately performed for the high wage sector and the low wage sector. The critical wage, which splits the dataset in these both sections, is defined as 450€. Thus, individual  $i$  will belong to the high wage sector if she earns an actual weekly wage that is not less than 450€. Following this approach, the high wage sector displays 6,229 observations that are allocated on 1,314 immigrants and 60 cases of return migration. The remaining



17,315 observations belong to the low wage group. Thus, 2,535 individuals and 257 events of return migration are located in this sector.

The Cox hazard estimation in table 5 analyzes again the determinants of  $y_{it}$  for the period of 1996–2011, using the duration of residence as the waiting-time concept and again using cluster-robust standard errors.

The U-shaped link between the endogenous variable  $y_{it}$  and wages, which Dustmann (2001) has found, is confirmed. Following the estimation results of specification 5, the non-proportional hazard ratio of weekly wage displays a very high value of about 10.9 that, however, decreases with proceeding residence in Germany considering the high wage sector. Thus, a dominance of the income effect for immigrants with an actual weekly wage of at least 450€ can be noted. On the contrary, the substitution effect is dominant in the group of low wages. This result is robust and not only valid for the definition of the critical wage as 450€. The domination of the income effect in the high wage sector and the domination of the substitution effect in the low wage sector is valid for all definitions of the critical wages in the interval  $\bar{w} \in [450\text{€}; 650\text{€}]$ .

## 6 Concluding remarks and discussion

This paper studied the determinants of return migration behavior by applying the non-proportional Cox hazard model to longitudinal micro data of GSOEP from 1996 to 2012 with a special focus on the interaction between human capital and labor market performance, social benefits and the life cycle model of Migration Economics.

With regard to supranational development policy, an over-average emigration of young immigrants, that have lived in Germany for several years, and that graduated in Germany and joined education investments, confirms the human capital thesis and fosters the economic development of developing countries by returning back home. Collecting labor market experiences in a highly industrialized country like Germany and afterwards returning back home with an increased level of human capital, stimulates the economic development of developing countries and serves as an efficient development aid. To realize a brain gain, the highly educated immigrants from developing countries should return even after realizing success on Germany's labor market. Otherwise there cannot be measured any brain gain.

The econometrical analysis showed an initially high return hazard of highly educated immigrants, that decreases with proceeding residence. By considering survivor functions, we have seen that highly educated immigrants display an over-average high return probability, independently of employment status and of obtaining social benefits. Thus, fostering brain gain and enabling (temporarily) internships for highly educated Non-Union immigrants, like it is done via so called (bilateral) mobility partnerships between European Union and third countries, might stimulate economic growth in the home countries. However, to evaluate the efficiency of a potential brain gain after return and to estimate the utility of mobility partnerships for the developing home countries, economic activities and occupational choices of the returners after the return in the home country needs to be studied. This is a task, future research should dedicate to.

Moreover, a high return probability of immigrants, coming from another state of EU, and especially a high probability of immigrants, which are simultaneously highly

qualified, were found. This fulfills the wishes of European policy, namely that free movement of workers inside the EU should increase the mobility of European workers.

Persons obtaining social benefits record *ceteris paribus* a higher return probability, albeit the strength of effect is decreasing with increasing years of residence. This last named effect is in interest of German migration policy. Reproaches, that interpret the possibility of obtaining social benefits as an incentive for an immigration to Germany and for a longer residence for immigrants in Germany, can for this reason be refuted empirically. Thus, social benefits empirically do not limit worker mobility. Furthermore, by taking macroeconomic developments in the home country into account, a low education either do not obstruct or lower labor mobility.

Particularly, immigrants, which obtain social benefits, return more likely when they display a cumulative unemployment duration of just a few months. Thus, these results demonstrate the need of instruments that strengthens incentives to work and search a job at an early stage of unemployment.

Long-term balance of public finance from migration does depend on both the immigration flow as well as on the emigration flow and particularly on the duration of residence, an immigrant lives and works in the host country. The years of residence as well as the wage and the employment status determine the accumulated contributions to the public old-age pension system. Considering Germany's old-age pension system, furthermore, the impact of increasing age and wage (including contributions to old-age pension system) is highly relevant. Applying the Cox hazard model has demonstrated the U-shaped links between metric-scaled age and return probability and between wage and return probability. By dividing the dataset in a high wage sector and a low wage sector, a domination of the substitution effect in the group of low wages and a domination of the income effect in the high wage sector have been shown. Studying the decision of return migration also helps to investigate migration behavior while approaching the official retirement age. With regard to age and outgoing from a high level, the probability of return migration initially decreases by 9.3% each year and then starts to increase after an age of 59.2 years is reached and while official retirement age is approaching.

Discrimination does not display any significant effect. This holds for any interaction term with labor market integration. Rash conclusions, however, may be dangerous in this case. Particularly, it cannot be concluded that discrimination does not have any impact on satisfaction of immigrants. Moreover, the consideration of only one single variable of discrimination does not allow a profound impress of discrimination of immigrants in Germany. The IAB-GSOEP Migration Sample that was launched in 2013 and that distinguishes between different forms of discrimination supplies new possibilities (Brücker et al, 2014). This new sample is worth of further future research on the topic of return migration especially with regard to discrimination, ethnic identity and circular and temporary migration behavior.

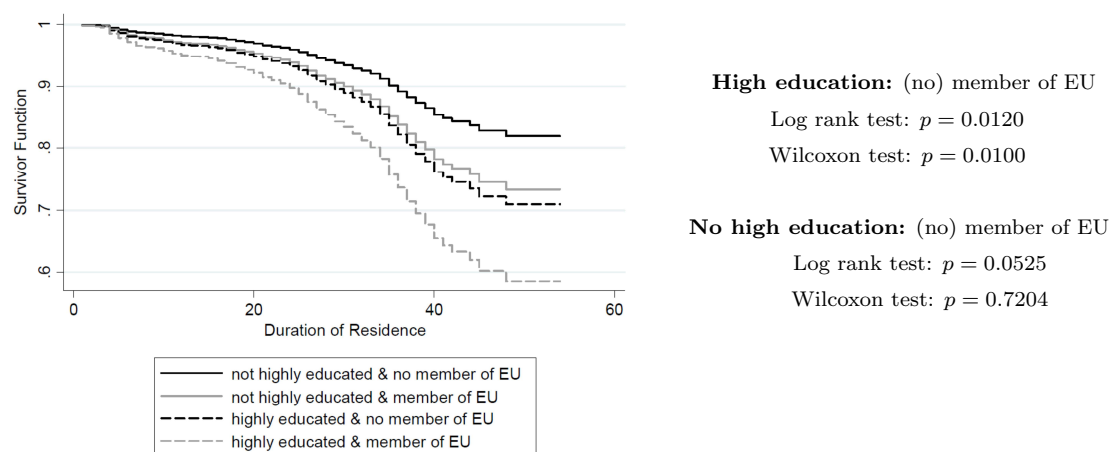
## Appendix

**Table A.1** Empirical effects on return migration  $y_{it}$  dependant on the (cumulative) duration of unemployment

Exogenous variables	(cum.) duration of unemployment < 1 year		(cum.) duration of unemployment > 2 year	
	Hazard ratio	Std. error	Hazard ratio	Std. error
<b>Life cycle model &amp; socio-geography</b>				
Age	0.935**	0.029	0.826***	0.051
Age squared	1.001*	0.0003	1.001**	0.0006
Weekly wage	1.008	0.023	0.921***	0.024
Relationship status	0.617***	0.117	1.207	0.349
Male sex				
Spouse in country of origin	2.951*	1.676	3.686	3.165
Children in household				
<b>Labor market &amp; geography</b>				
Full-time employed	0.513***	0.093	0.403**	0.152
Cumulative duration of unemployment	0.623	0.227	1.266***	0.088
Obtaining social benefits	4.490***	1.729	1.320	0.719
Obtaining social benefits*employed				
High education	10.017***	3.845	0.581	0.594
High education*employed				
Low education	1.181	0.201	0.954	0.231
Low education*employed				
Member of EU	1.159	0.189	2.481***	0.578
<b>Societal integration</b>				
Discriminated*high education	0.747	0.413		
German citizenship	0.340***	0.090	0.349*	0.211
Double citizenship				
German language skills	0.439***	0.077	0.441***	0.126
Remittances	2.882***	0.677	2.805**	1.232
tvc (obtaining social benefits)	0.963*	0.019	0.970	0.019
tvc (high education)	0.933***	0.020		
tvc (low education)				
tvc (cumulative duration of unemployment)			0.994**	0.002
<b>Stratification</b>				
Number of observations	15,165		4,937	
Individuals	2,098		655	
Cases of return migration	187		88	
Log likelihood	-1,198.6654		-435.46943	
LR $\chi^2$	145.81***		78.36***	

Notification: \*significant at 10%, \*\*significant at 5%, \*\*\*significant at 1%

Source: GSOEP, own illustration



**Fig. A.1** Survivor functions: the link between education and location of country of origin  
 (Source: GSOEP)

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