

Emigration of Immigrants - Do Skills Affect Duration?

SANNE SCHROLL
CEBR and SDU

April 10, 2009

1 Introduction

The literature on emigration of immigrants is growing, both the theoretical and the empirical part. Most of this literature is focused on return migration, meaning immigrants returning to their home countries. However, it is not all emigrating immigrants that return home, some migrate onward to new host countries, seeking their fortune in a new country, but only very few empirical studies have focused on onward migrants; see e.g. Nekby (2006).

This paper estimates the emigration of immigrants using duration analysis. I answer two important questions for the host countries. First, whether skills affect emigration of immigrants, regardless of whether they return or migrate onward. Second, do skills affect return and onward migration differently?

I divide my analysis into these two issues, since both are interesting from the perspective of the host country. First, most Western European countries are to some extent trying to attract high skilled labor due to low fertility rates and ageing native populations. Attracting these high skilled migrants is one thing; another is to keep them after their arrival. It is well known that immigration is not always a permanent decision since many migrants choose to leave after a period abroad either returning home or migrating onward to a third country. The host country would therefore be interested in whether high skilled immigrants have a higher probability of out-migration than others, since this is the group of immigrants that is most wanted on the labor market.

Second, if high skilled immigrants have a higher probability of out-migration, which the analysis show that they do, it is important for the host countries to know whether these emigrating immigrants are returning home or migrating

onward. This differentiation is important since the political implications of these different types of out-migration would be different. Return and onward migrants probably do not out-migrate for the same reasons, and therefore it would also not be the same political initiatives that would help to attract the two types of emigrating immigrants to stay for a longer period or permanently.

High skilled immigrants could be expected to have a higher probability of both return and onward migration than others from a host country like Denmark, from where data for this analysis come. With regard to return migration, Dustmann (2003) argues that high skilled will be able to accumulate wealth faster, which is then preferred spend in the home country, and therefore the probability of return migration is higher for this group than others. Further, due to the relatively flat wage structure and relatively high tax level for high income levels in Denmark, high skilled immigrants might be more disappointed about the economic possibilities here than other migrants, and hence have a higher probability of onward migration to a different host country.

My contribution to the literature is the answering of these two important questions for the host countries. My use of duration analysis is also contributing to the literature as no other estimation of emigration of immigrants uses duration analysis but linear regression models. By using duration analysis I can control for unobserved heterogeneity, allow for flexible duration dependence in the probability of emigration, and include right censored migration spells, meaning that I can include all immigrants regardless of they are still in the country or have emigrated, and I do not have to make any assumptions about when they might leave. Further, by being able to distinguish between return and onward migration my answer to especially the second question is much more diverse than most previous estimates of the emigration of immigrants.

The rest of the paper is organized as follows. Section 2 presents the theoretical and empirical framework for this paper. Data from Statistics Denmark are presented in Section 3, and Section 4 presents the econometric model. In Section 5 the empirical hypotheses are presented, and in Section 6 the results are outlined. Finally, Section 7 concludes. Appendix A presents the competing risk duration model and Appendix B presents extra estimations.

2 Theoretical and Empirical Framework

All though the literature on emigration of immigrants is growing, there is not much focus on onward migration as most of the literature focuses on return

migration. This applies for both the theoretical explanations for emigration of immigrants and also the empirical estimates, where emigrating immigrants are often just assumed to be returning home all though the destination is often unknown.

Several different reasons for return migration are modeled in the theories of return migration. In several papers Dustmann (1996, 2001, 2003) mentions three different reasons for return migration despite of persistently higher wages in the host country. First, the migrant might have preferences for consumption in the home country. Second, human capital required in the host country which is only (or more) earnings effective in the home country, and finally, higher purchasing power of savings in host country currency in the home country. Several other papers mentions similar reasons for return migration; see e.g. Hill (1987) and Djajic and Milbourne (1988) both talking about home country specific preferences and Borjas and Bratsberg (1996) about higher purchasing power of savings in the home country.

Dustmann (2003) argue that high skilled immigrants would be assumed to have higher incomes than other immigrants and therefore be able to accumulate wealth faster, which would then be preferred spend in the home country, and therefore high skilled immigrants would also have a higher probability of return migration.

However, the reasons for onward migration are probably more similar to the initial reasons for first-time migration than the return migration reasons. If the emigrating immigrant chooses to migrate onward instead of returning or staying in the first host country it could be assumed that (s)he is still looking for the same things that drew the initial migration. The migration literature takes its departure in the neoclassical theory with Hicks (1963, first published in 1932) and Sjaastad (1962) emphasizing wage differentials between the sending and receiving region/country as the main reason for migration. The theories by Lewis (1954) and Harris and Todaro (1970) also model migration as an optimization of life time earnings. Migrants move to the country or region where wages are highest compared to their home country. Borjas and Bratsberg (1996) continue this literature by arguing that migration is part of an optimal life-cycle plan. Borjas and Bratsberg state that immigrants plan their migration and return migration as part of an "optimal life-cycle residential location sequence". Onward migrants could be assumed to do the same. Due to difficulties for the migrant in attaining exact information about the economic situation in the host country, some migrants are disappointed about their possibilities in the host country after arrival. Borjas and Bratsberg (1996) argue that another reason for return migration would be this disappointment in the economic possibilities due to initial erroneous information. However, if the migrants want to pursue a life

abroad with higher life time income, there is a probability that some would want to continue this pursue in a new host country if the first turns out to be not as economically beneficial as expected, instead of just returning home, as Borjas and Bratsberg suggests. Constant and Massey (2003) also emphasize that even though the motives for migration for emigrating immigrants to some degree are similar to all other migration motives, return (and onward) migrants differ from first-time migrants because they are more likely to migrate than others since they have already migrated at least once.

Especially high skilled immigrants could be expected to have a higher probability of onward migration from a host country like Denmark due to the relatively flat wage structure and relatively high tax level for high incomes. These two things combined could lead to especially high skilled immigrants being disappointed by the economic possibilities in Denmark.

Most of the empirical literature on return migration focuses on estimating the determinants of return migration or the duration in the host country. Regression estimates for the out-migration rate for immigrants in the host country are obtained primarily by OLS, logit and probit estimations; see e.g. Borjas and Bratsberg (1996), Dustmann (1996), Mesnard (2004), and Jensen and Pedersen (2007). The return probability is found to decrease in the length of stay and more educated are found to leave more often than others.

However, none of these estimates are using duration analysis or distinguishing between return and onward migration. To the best of my knowledge there are not any studies that estimate the emigration of immigrants using duration analysis and only a few distinguishes between return and onward migration, like this paper does.

Migration data will by nature be right censored since observing a given time period will always leave a data set with several complete migration spells and several incomplete migration spells, meaning that the immigrant has not yet emigrated, and we do not know if (s)he will do so in the future or when. The duration analysis is very well suited for this type of empirical analysis. By using duration analysis I can control for unobserved heterogeneity, allow for flexible duration dependence in the probability of emigration, and include right censored migration spells. Using other types of regression analysis will restrict the analysis because you would have to restrict the dependent variable and disregard the right censored spells of your data or consider these as stayers.

Constant and Massey (2003) estimates the emigration probabilities for immigrants in Germany using a multinomial logit model. They do not distinguish between return and onward migration and refers to emigration as return migration. They use a 14 year panel; the German Socioeconomic Panel

(GSOEP) from 1984-1997. In this period 817 immigrants are documented to have emigrated from Germany. Constant and Massey are able to distinguish between the immigrants who choose to stay in Germany, those who move out of Germany, and those who are lost to follow-up. They estimate the probability of out-migration and the probability of leaving the panel. The probability of out-migration is the estimate of the choice between emigration versus staying in Germany, where the probability of leaving the panel is the choice outcome for immigrants that left the panel versus those staying in Germany. The results for the emigrating immigrants show that with regard to skills none of the variables are statistically significant. Meaning that level of education either from the home country or Germany does not affect the probability to out-migration. The only skill related variable that is statistically significant is fluency in German language, which decreases the probability of out-migration. Further, immigrants with none or only marginal attachment to the labor market seem to have a higher probability of out-migration than others. Constant and Massey are imitating a duration analysis by including four dummy variables for *time since migration*. The first dummy is 0-5 years since migration, the second is 6-12 years since migration, then 13-19 years since migration and finally more than 20 years since migration. Only the first dummy (0-5 years since migration) is statistically significant. The coefficient is 0.365, meaning that if it is 5 years or less since the immigrant migrated the probability of out-migration is 36.5 percent higher than for others.

Using duration analysis coefficients for each year since immigration will be estimated, showing the specific dependency rate for out-migration in regard to years since migration.

Distinguishing between return and onward migration is crucial for the political implications of the out-migration rate. However, not many analyses make this distinction, maybe due to lack of information. One of the few analyses that do distinguish between return and onward migration is Nekby (2006).

Nekby (2006) analyzes emigration propensities for natives and immigrants, distinguishing among emigrating immigrants between return and onward migration. Data for the analysis comes from Statistic Sweden including all individuals aged 16 years and older who have emigrated from Sweden during the period from 1991-2000. However, Nekby restricts the sample to contain individuals between 26 and 64 years of age, and she also excluded repeat migrants from the subsample, meaning emigrating immigrants that repeatedly migrate between their home country and Sweden. The final data set contain almost 250,000 observations on immigrants. Nekby estimates the probability of emigration using a linear probability model, and as a check for robustness logit, multinomial logit and probit models are also estimated. The

dependent variable is a dummy variable indicating whether the immigrants emigrated in year t or not. The results show that the probability of return migration is higher for immigrants with education levels at University and Ph.D. level compared to individuals with primary education, whereas immigrants with secondary education have a lower return migration propensity than immigrants with primary education. Onward migrants are shown to have strictly increasing emigration propensities as the level of education is increasing. Further, immigrants with the highest level of income also have higher return and onward migration rates than other immigrants.

This paper estimates the emigration of immigrants distinguishing between return and onward migration using duration analysis. I answer two important questions for the host countries. First, whether skills affect emigration of immigrants, regardless of whether they return or migrate onward. Second, do skills affect return and onward migration differently?

I divide my analysis into these two issues, since both are interesting from the perspective of the host country. First, most Western European countries are to some extent trying to attract high skilled labor due to low fertility rates and ageing native populations. Attracting these high skilled migrants is one thing; another is to keep them after their arrival. It is well known that immigration is not always a permanent decision since many migrants choose to leave after a period abroad either returning home or migrating onward to a third country. The host country would therefore be interested in whether high skilled immigrants have a higher probability of out-migration than others, since this is the group of immigrants that is most wanted on the labor market.

Second, if high skilled immigrants have a higher probability of out-migration, which the analysis show that they do, it is important for the host countries to know whether these emigrating immigrants are returning home or migrating onward. This is important since the political implications of these different types of out-migration would be different. Return and onward migrants probably do not out-migrate for the same reasons, and therefore it would also not be the same political initiatives that would help to attract them to stay for a longer period or permanently.

The theoretical literature presented above show that high skilled immigrants could be expected to have a higher probability of both return and onward migration than others from a host country like Denmark, from where data for this analysis come. With regard to return migration, Dustmann (2003) argues that high skilled will be able to accumulate wealth faster, which is then preferred spend in the home country, and therefore the probability of return migration is higher for this group than others. Further, due to the relatively flat wage structure and relatively high tax level for high in-

come levels in Denmark, high skilled immigrants might be more disappointed about the economic possibilities here than other migrants, and hence have a higher probability of onward migration to a different host country.

This paper contributes to the literature by answering these two important questions for the host countries. My use of duration analysis is also contributing to the literature as no other estimations of emigration of immigrants use duration analysis but only linear regression models. Further, by being able to distinguish between return and onward migration my answer to especially the second question is much more diverse than most previous estimates of the emigration of immigrants.

In the following section I present the data used for the analysis and thereafter the econometric model.

3 Data

I use a very rich data set for the Danish Labor Market; the Integrated Data base for Labor Market Research (IDA) from Statistics Denmark. IDA holds annual information about labor market status and socioeconomic characteristics of all Danish residents in the period 1986-2005. Further, I apply the Danish Data base of Migration which holds information on all individuals moving in to or out of Denmark.

The information from these two data sets are merged into one data set, which then holds information on each individual aged 15 or more migrated into Denmark once or more in the period 1986-2005. These data then contains information on Danish individuals (individuals with Danish born parents), foreign born individuals with foreign born parents, and Danish born individuals with foreign born parents. I exclude the first group of individuals, since I assume that they have a special connection to Denmark, and therefore their migration patterns will be driven by different motives than the two other groups. Further, I also exclude people who are in Denmark only to study, since their migration pattern also is driven by different motives than others.

The data set is then converted so that each individual has one observation for each year of his/her duration in Denmark, i.e. if a person migrates into Denmark in 1985 and out again in 1990 then there will be 6 observations for this individual for this spell. In Table 1 it can be seen that there are 119,703 individual immigrants in the period and that these individuals have 127,532 migration spells with a mean duration of 12 years. Almost 10,000 individuals have migrated into Denmark more than once in this period. This leads to a final migration data set for all immigrants with more than 1.2

million observations.

[Insert table 1 around here]

From this combined data set I subtract a ten percent sample for the analyses. The sample is carefully constructed so that for each individual drawn for the sample all spells and all years are drawn, i.e. if an individual migrates into Denmark twice during the period, (s)he will have two migration spells each containing the number of years the immigrant was in Denmark. The sample will then contain both of these spells and all years in each spell. At the end of each migration spell I distinguish between return and onward migration for the competing risk model. However for the single risk model a spell is just ending with no distinction to why. For all spells ending before or in 2005 I will know their destination. However, all spells not ending during this period will be right-censored.

All explanatory variables come from the IDA data base. I include four skill variables including *high income*, a dummy for whether the individual belongs to the highest quartile in the income distribution in a given year. *Initial education*, years of education from the country of origin, and *obtained education*, years of education obtained in Denmark, are also included in this category, as are *experience in Denmark*, measuring the number of years employed in Denmark.

Further, I include several control variables including individual characteristics as *age* and *age*², *male*, four labor market variables; *self employed*, *worker*, *unemployed* and *outside* the labor market. Further, whether you have a *partner* and if this is a *Danish partner*, *children* living with you, and whether you live in *Copenhagen* (the Danish capital city), one of the five other *largest cities*, or in a *rural* area. In addition, I also include control variables for which country group the immigrant comes from. All countries are divided into four country groups; *EU – 15*¹, *Eastern Europe*², *highly developed countries*³ and *less developed countries*⁴. These country groups are constructed with regard to how easy immigration is in and out of Denmark for immigrants. Citizens from EU-15 all have free immigration rights in and out of Denmark, due to the membership of the European Union. The Eastern Europe group consist of the countries included in the European Union in May 2004, these countries have all had limited access to immigra-

¹The 15 countries included in EU before May 1, 2004

²The countries included in EU in the enlargement of May 1, 2004. The countries are: Cyprus, Estonia, Latvia, Lithuania, Malta, Poland, Slovakia, Slovenia, the Czech Republic, Hungary, Bulgaria and Rumania.

³Follows the UN definition; see <http://esa.un.org/unpp/definition.html>

⁴This group includes immigrants from the remaining countries primarily less developed countries, but also immigrants of unspecified origin.

tion to Denmark from 1986 until 2004, and most of them were also included by transitional rules in the period from 2004 until 2006, limiting the access to the Danish labor market for these countries. The two last country groups are constructed accordingly to the UN definition of high developed and less developed countries. I make this distinction because immigrants from less developed countries immigrating into Denmark most often will be refugees from their home country, and therefore their ability to emigrate after successfully immigration into Denmark, will be very different than immigrants from any of the other country groups. Their ability to immigrate into Denmark and other host countries will also follow very different rules than any of the other immigrant groups. Immigrants from highly developed countries will for the most part not have any troubles migrating back to their home country or even onward migrating to other countries. However, their migration into Denmark will be more restricted than immigrants from either of the two European country groups.

[Insert Table 2 around here]

Table 2 presents summary statics and distributions for the explanatory variables. Note that the mean values are calculated for the data sets where each individual is included with one observation for each year (s)he is in Denmark. Therefore an individual staying in Denmark for 10 years will count 10 times, whereas an individual only staying one year, will only count once.

All analyses are executed in Gauss. The 10 percent random sample of the data set holds 121,903 observations.

In the following I present the econometric model and thereafter the empirical hypotheses.

4 The Econometric Model

Duration analysis has its origin in survival analysis, where the duration of interest is the survival time of a subject. However, in economics duration analysis has recently been more and more applied to analyze the duration time of different variables. Such studies include the duration of unemployment, see e.g. Lalive et al. (2006), and the duration of new firm's life time, see e.g. Mata and Portugal (1994).

Duration analysis has to the best of my knowledge not been used to analyze the duration of migration and return migration, all though this type of analysis suits migration data perfectly. Migration duration data are characterized by a number of observations being right censored, since when we observe the migrants coming into the country during some period, not all

will have left when we end our observation period. So we have both data for individuals with a well-defined duration time in the country, and data for individuals who have migrated in to the country and who are still there. For these individuals we do not know whether they will stay forever, or leave the country at some future date. The duration of these individuals are thus right censored. It is therefore natural to use duration analysis which allows for right-censored data. Further, it seems logical that the probability of out-migration will have some dependency of the duration in the host country. Immigrants who have lived in the host country for many years might not have as high a probability of out-migration as new immigrants, since they have establish network and labor market connection in the new host country. Duration analysis captures this time dependency.

I estimate both a single-risk duration model, where the only possibility for a spell to end is the migrant leaving the country, and a competing risk duration model, where the spell can end for two reasons, either the migrant migrates back to the home country, or (s)he migrates onward to a third country, i.e. return and onward migration. Both models are estimated as a basis model where I do not control for unobserved heterogeneity and a more extended model where I do control for unobserved heterogeneity.

Here I present the theory behind the single risk duration model which control for unobserved heterogeneity. The competing risk model is presented in Appendix A.

Even though my data are quite extensive there might be some unobserved heterogeneity left, since not all characteristics can be measured, e.g. the urge to travel and see new places and experience new countries and cultures is very difficult to measure, and will probably influence the duration in a set of migration data. I capture these unobserved migrant characteristics by specifying a mixed proportion hazard model for return migration:

$$\theta(t|x_t, v) = \lambda(t) \cdot \exp(\beta x_t + v) \quad (1)$$

where θ is the instantaneous hazard rate for each t given the observed time-varying and the unobserved characteristics. The first term, $\lambda(t)$ is the base-line hazard capturing the time dependence in return migration. That is for each t , $\lambda(t)$, is the instantaneous rate of leaving per unit of time. The second term, $\exp(\beta x_t + v)$ is the systematic part given the observed time varying characteristics, x_t , and the unobserved characteristics, v .

Given that my data set is annual, my duration variable, T , will be grouped in $K + 1$ intervals, $\{[0, t_1), [t_1, t_2), \dots, [t_k, \infty)\}$. The econometric specification need to take this into account. I therefore follow Kiefer (1990) and define

the interval specific survival rate as follows:

$$\begin{aligned}
\alpha_k &= P(T \geq t_k | T \geq t_{k-1}, x_k, v) \\
&= \exp \left[- \int_{t_{k-1}}^{t_k} \theta(t | x_k, v) dt \right] \\
&= \exp [- \exp(\beta x_k + v) \Lambda_k]
\end{aligned} \tag{2}$$

where $\Lambda_k = \int_{t_{k-1}}^{t_k} \lambda(t) dt$ and $\alpha_k = \exp [- \exp(\beta x_k + v) \Lambda_k]$.

The interval specific survival rate is the probability that the migrant stays in the country in period k , given that (s)he has stayed until period k .

The probability that a migration spell ends in the k' th interval is given by the conditional probability of a migration spell ending at that interval times the probability that the spell has survived until this interval, so a spell ending in interval k , will contribute to the likelihood function with $(1 - \alpha_k) \prod_{j=1}^{k-1} \alpha_j$. A right censored spell will contribute with $\prod_{j=1}^k \alpha_j$ which is the probability that the spell has survived up to and including the k' th interval. The contribution to the likelihood function from a migration spell ending in interval k , can be written as:

$$L = (t | x_1, \dots, x_k, v) = (1 - \alpha_k)^{d_r} \alpha_k^{(1-d_r)} \cdot \prod_{j=1}^{k-1} \alpha_j \tag{3}$$

where d_r is a return dummy. If the spell is right censored $d_r = 0$

In many duration analyses a functional form is imposed on the baseline hazard function, but here I allow the baseline hazard to be flexible by simply estimating the interval specific baseline parameters, Λ_k .

Unobserved heterogeneity is as mentioned specified by the stochastic variable, v , with the CDF denoted as $F(v)$. For simplicity, it is assumed that v can only take two values, where one of the support points in the hazard function is normalized to zero. This specification is flexible and widely applied (see e.g. van den Berg, 2001). The complete contribution to the likelihood function from a migration spell is therefore given by:

$$\begin{aligned}
L &= \int_{\underline{v}}^{\bar{v}} L(t | x_1, \dots, x_k, \beta, v) dF(v) \\
&= L(t | x_1, \dots, x_k, \beta, \underline{v}) P(\underline{v}) + L(t | x_1, \dots, x_k, \beta, \bar{v}) (1 - P(\bar{v}))
\end{aligned} \tag{4}$$

Van den Berg (2001) includes more details on this class of mixture distributions in duration models.

In the competing risk model I distinguish between two reasons for a spell to end; return migration and onward migration. This model is generally the same as the single risk model only that there are now two possibilities for a spell to end, namely if the immigrants emigrate home (i.e. return migrates) or if (s)he migrates to a new destination (i.e. onward migrates). Otherwise the specifications are similar to the single risk model, so I will not go into more details with the competing risk model here, but the specifications can be seen in Appendix A.

5 Empirical Hypotheses

The two questions this analysis sets out to answer is first, whether skills affect emigration of immigrants, i.e. do high skilled immigrants have a higher probability of out-migration than others? Second, do skills affect return and onward migration differently?

I use the single risk duration analysis to answer the first question. The dependent variable is whether the immigrant emigrates or not in a specific year. Skills are measured by whether the immigrant belongs to the highest 25 per cent income, *high income*, the number of years of education when the immigrant enters the host country, *initial education*, the number of years of education obtained while in the host country, *obtained education*, and finally the years of labor market experience in the host country, experience in Denmark. The specific hypotheses tested using the single risk model is then:

- Do skills affect emigration of immigrants? Specifically, the effect of income, education and labor market experience are tested:
 - The probability of out-migration is higher for immigrants with high incomes
 - The probability of out-migration is increasing in the years of education, regardless of education is obtained in the home country or the host country
 - The probability of out-migration is decreasing in the years of experience in the labor market of the host country.

Answering the second question I use the competing risk duration analysis, which distinguishes between return and onward migration. The depended variable is now whether the immigrant returns or whether the immigrant migrates onward in a specific year, and skills are measured in the same way as

in the single risk model. The specific hypotheses tested using the competing risk model is then:

- Do skills affect return and onward migration differently? Specifically, it is tested whether the effect of income, education and labor market experience is different for the two types of emigration:
 - Both return and onward migration are affected positively by income, but onward migration is affected more than return migration
 - Both return and onward migration are affected positively by years of education, both education obtained in the home country and in the host country. Onward migration is affected more by both types of education than return migration
 - Both return and onward migration are affected negatively by the years of labor market experience in the host country. Return migration is expected to be less affected than onward migration.

Onward migration is expected to be more affected by income and education than return migration, due to the reasons given above, where onward migration is presented as disappointed immigrants seeking their fortune in a new host country. Especially, immigrants with high incomes and high educations could be assumed to be disappointed by the economic possibilities in a host country like Denmark, due to the relatively flat wage structure and relatively high tax on individuals with high incomes. However, return migration is expected to be less affected by labor market experience than onward migration since return migration is assumed more often to be part of an optimal life-cycle plan, where the return migration have been part of the plan from the beginning. Therefore the return migrant will have a higher probability of emigration despite of years of labor market experience in the host country.

The results of the estimations of both the single risk and the competing risk model are presented below.

6 Results

Before I present the results of the empirical estimations let me turn to the empirical hazards, showing the duration dependence for out-migration (i.e. the single risk model), and return and onward migration (i.e. the competing risk model). Figure 1 present all three empirical hazards and it is clear that

for the first five years all three types of migration is decreasing in the years of residence in the host country, and after the fifth year this dependency flattens out.

The estimation of the basic single risk duration model is presented in Table 3. The overall question for the single risk estimations is whether skills affect emigration, and it is clear that the answer to this question is yes. Immigrants with higher income have a higher probability of out-migration than others, i.e. the coefficient is positive and statistically significant. The coefficient is 0.29 meaning that if the immigrant belongs to the quartile with the highest incomes, then (s)he will have 29 per cent higher probability of out-migration. Further, the coefficients for education, obtained either in the home or the host country, are both around 0.06 and statistically significant. This means that for each year of extra education the immigrant will increase his/her probability of out-migration with 6 per cent. The only skill variable that is not statistically significant in the single risk estimation is the coefficient for labor experience in Denmark. The sign is negative as expected, but the coefficient is not statistically significantly different from zero on a five percent significance level. This means that the probability of out-migration is not affected by an extra year of experience on the Danish labor market.

The estimation of the basic competing risk model is presented in Table 4. Here the overall question was whether skills affect onward migration different than return migration. This question is a bit more complex than the first question. However, it is clear that all coefficients are higher for onward migration than return migration, so the answer to the question is; yes, onward migration is affected more by skills than return migration is. All coefficients for the four skill variables have the expected signs for both return and onward migration, and only the coefficient for experience in Denmark for return migration is not statistically significant. The coefficient for high income is 0.16 for return migration and 0.68 for onward migration. This means that immigrants with income in the highest quartile will have 16 percent higher probability of return migration and 68 percent higher probability of onward migration. This shows that onward migration is affected more than return migration by high income. Further, for education the coefficients for return migration are around 0.06 for both initial education and education obtained in the host country, whereas for onward migration these coefficients are respectively 0.07 and 0.08. This means that the probability of return migration is increasing with 6 percent for each extra year of education regardless of it is obtained in the home or the host country. However, the probability of onward migration is increasing with 7 percent for each year of extra education from the home country and 8 percent for each year of extra education obtained in the host country, so onward migration is affected more than return migra-

tion by education. Finally, the coefficient for labor market experience is -0.04 for onward migration, meaning that the probability of onward migration decreases in the years the immigrants is employed in the Danish labor market. However, this coefficient is not statistically significant for return migration, which means that the probability of return migration is not affected by the number of years the immigrant is employed in the Danish labor market, just as expected since return migration probably is more part of an initial plan and therefore not very much affected by the number of years in the Danish labor market.

In conclusion, the answers to the two questions stated initially are yes. Out-migration is affected by skills - high skills have a higher probability of out-migration than others. And onward migration is affected more by high skills than return migration; i.e. the two types of emigration are affected differently.

Besides the skill variables both estimations include several control variables. In the single risk estimation most of these are statistically significant, only male and self employed are not. Older immigrants have lower probability of out-migration, although this tendency flattens out (*age squared* is positive). Unemployed immigrants have a lower probability of out-migration than employed immigrants; this could be due to the relatively high level of social welfare in Denmark if people are unemployed. Being outside the labor market does on the other hand increase the probability of out-migration. Having a partner (Danish or not) and/or having children is decreasing the probability of out-migration, and immigrants living in Copenhagen or one of the largest cities have a higher probability of out-migration than immigrants living in a rural area. As expected immigrants from EU-15 have the highest probability of out-migration. In Appendix B Table 3A presents the estimation of the single risk model including unobserved heterogeneity. The results are very similar to the results of the basic model. For the skill variables all coefficients are a little higher, and labor market experience is now statistically significant and negative.

In Table 4 almost all of the control variables for the estimation of return migration are statistically significant. Similarly to the single risk estimation only male and self employed are not statistically significant, and the signs for rest of the variables are also similarly to the estimations of the single risk model. However, for onward migration less of the control variables are statistically significant. Unemployed is still negative and statistically significant, just as partner and children both are. Living in Copenhagen or one of the largest cities is also still increasing the probability of out-migration compared to immigrants living in a rural area, and immigrants from EU-15 also have the highest probability of onward migration. However, for the single risk

model and for return migration the coefficient for less developed countries had the highest negative coefficient of the three country group coefficients, but for onward migration this coefficient is now the smallest. Including unobserved heterogeneity, as is done in Table 4A in Appendix B, does almost not change the coefficients in the competing risk model.

7 Conclusion

This paper answers two important questions for the host countries of immigrants, and it turns out that both questions can be answered with yes. First, high skilled immigrants do have a higher probability of out-migration than others, and second there is difference in the effect of skills on return and onward migrants, i.e. onward migrants are much more affected by skills than return migration is.

The reason that these questions are interesting for the host countries is the policy implications. Emigrating immigrants are affecting the skill composition of the labor force in the host country, just as emigrating natives, and since most Western European countries to some extent are trying to attract especially high skilled labor immigrants it is crucial to know whether the ones that are attracted actually also stay or emigrate again. But knowing that high skilled immigrants have a higher probability of out-migration is not enough. There are probably large differences between the migration motives for return and onward migration and therefore it is also crucial to know whether the high skilled emigrating immigrants are primarily returning home or migrating onward.

This analysis shows that high skilled immigrants are indeed emigrating more than others, and that they are more likely to be onward migrating than returning, although the probability of return migration is also increasing.

Host countries wanting to hold on to high skilled immigrants once they have migrated into the country therefore need to present policies that attract both immigrants wanting to return as part of an initial plan and immigrants wanting to migrate onward perhaps due to disappointed expectations about the economic possibilities in the host country.

References

- [1] Borjas G. J. and B. Bratsberg, 1996, Who Leaves? The Outmigration of the Foreign Born, *Review of Economics and Statistics*, Vol. 78. No. 1, pp 165-176
- [2] Constant, A. and D. S. Massey, 2003, self-selections, earnings and out-migration: A longitudinal study of immigrants to Germany, *Journal of Population Economics*, Vol. 16, No. 4, pp. 631-653
- [3] Djajic, S. and R. Milbourne, 1988, A General Equilibrium Model of Guest-Worker Migration, *Journal of International Economics*, Vol. 25, pp. 335-351
- [4] Dustmann, C., 1996, Return Migration. The European Experience, *Economic Policy*, April 1996, pp. 213-250.
- [5] Dustmann, C., 2001, Why Go Back? Return Motives of Migrant Workers, *International Migration: Trends, Policy and Economic Impacts*, Chapter 11. S. Djajic (ed.) Routledge.
- [6] Dustmann, C., 2003, Return Migration, wage differentials, and the optimal migration duration, *European Economic Review*, Vol. 47, issue 2, pp.353-369
- [7] Dustmann, C. and Y. Weiss, 2007, Return Migration: Theory and Empirical Evidence from the UK, *British Journal of Industrial Relations*, Vol.. 45, issue 2, pp. 236-256
- [8] Harris, J. R., and M. Todaro, 1970, Migration, Unemployment and development: A Two-Sector Analysis. *American Economic Review*, Vol. 60, No. 1, pp. 126-142.
- [9] Hill, J.K., 1987, Immigrant Decisions Concerning Duration of Stay and Migratory Frequency, *Journal of Development Economics*, Vol. 22, pp. 221-234
- [10] Hicks, J. R., 1963, *The Theory of Wages*, Macmillan and co. ltd., 2. edition.
- [11] Jensen, P., and P.J. Pedersen, 2007, To Stay or Not to Stay, Out-Migration of Immigrants from Denmark, *International Migration*, Vol. 45, No. 5, pp.87-113

- [12] Kiefer, N. M., 1990, "Econometric Methods for Grouped Duration Data" in J. Hartog, G. Rider, and J. Theeuwes (eds.), *Panel Data and Labour Market Studies*, North Holland, Amsterdam
- [13] Lalive, R., J. Van Ours, J. Zweimüller, 2006, How Changes in the Financial Incentives Affects the Duration of Unemployment, *Review of Economic Studies*, Vol. 73, issue 4, pp. 1009-1038, October 2006.
- [14] Lewis, W. A., 1954, Economic Development with Unlimited Supplies of Labour, *The Manchester School*, Vol. 22, Del. 2, pp.139-191
- [15] Mata, J. and P. Portugal, 1994, Life Duration of New Firms, *Journal of Industrial Economics*, Vol. 42, No. 3, pp.227-245, September 1994
- [16] Mesnard, A., 2004, Temporary Migration and Capital Market Imperfections, *Oxford Economics Papers*, Vol. 56, pp. 242-262
- [17] Nekby, Lena, 2006, The Emigration of Immigrants, Return vs. Onward Migration: Evidence from Sweden, *Journal of Population Economics*, Vol. 19, Number 2, pp. 197-226, June 2006
- [18] Reagan, P. B. and R. J. Olsen, 2000, You Can Go Home Again: Evidence from Longitudinal Data, *Demography*, Vol. 37, No. 3, pp. 339-350
- [19] Sjaastad, L. A., 1962, The Costs and Returns of Human Migration, *Journal of Political Economy*, Vol. 70, No. 5, Part 2, pp. 80-93
- [20] van den Berg, 2001, Duration Models: Specifications, Identifications, and Multiple Durations, in J. J. Heckman and E. Leamer (eds.), *Handbook of Econometrics*, Vol. V, North Holland, Amsterdam, 2001

8 Appendix A

The competing risk duration model is presented here.

Unobserved migrant characteristics are captured by specifying a mixed proportion hazard model for return migration:

$$\theta_i(t|x_t, v_i) = \lambda(t) \cdot \exp(\beta x_t + v_i) \quad (5)$$

where $i = r, o$ indicates the different destination states (i.e., return or onward migration). θ is the instantaneous hazard rate for each t given the observed time-varying and the unobserved characteristics. The first term, $\lambda(t)$ is the baseline hazard capturing the time dependence in return migration. That is for each t , $\lambda(t)$, is the instantaneous rate of leaving per unit of time. The second term, $\exp(\beta x_t + v_i)$ is the systematic part given the observed time varying characteristics, x_t , and the unobserved characteristics, v_i .

Given that my data set is annual, my duration variable, T , will be grouped in $K + 1$ intervals, $\{[0, t_1), [t_1, t_2), \dots, [t_k, \infty)\}$. The econometric specification need to take this into account. I therefore follow Kiefer (1990) and define the interval specific survival rate as follows:

$$\begin{aligned} \alpha_{i,k} &= P(T \geq t_k | T \geq t_{k-1}, x_k, v_i) \\ &= \exp \left[- \sum_{i=r,o} \int_{t_{k-1}}^{t_k} \theta(t|x_k, v_i) dt \right] \\ &= \exp \left[- \sum_{i=r,o} \exp(\beta_i x_k + v_i) \Lambda_{i,k} \right] \\ &= \prod_{i=r,o} \alpha_{i,k} \end{aligned} \quad (6)$$

where $\Lambda_{i,k} = \int_{t_{k-1}}^{t_k} \lambda_i(t) dt$ and $\alpha_{i,k} = \exp[-\exp(\beta_i x_k + v_i) \Lambda_{i,k}]$.

The interval specific survival rate is the probability that the migrant stays in the country in period k , given that he has stayed until period k .

The probability that a migration spell ends in the k' th interval is given by the conditional probability of a migration spell ending at that interval times the probability that the spell has survived until this interval, so a spell ending in interval k , will contribute to the likelihood function with $(1 - \alpha_k) \prod_{j=1}^{k-1} \alpha_j$. A right censored spell will contribute with $\prod_{j=1}^k \alpha_j$ which is the probability that the spell has survived up to and including the k' th interval. The contribution to the likelihood function from a migration spell ending in interval k , can be written as:

$$L = (t|x_1, \dots, x_k, v_r, v_o) = (1 - \alpha_{r,k})^{d_r} (1 - \alpha_{o,k})^{d_o} \alpha_k^{(1-d_r-d_o)} \prod_{j=1}^{k-1} \alpha_j \quad (7)$$

where d_r and d_o are destination state indicators. If the spell is right censored $d_r = d_o = 0$

In many duration analyses a functional form is imposed on the baseline hazard function, but here I allow the baseline hazard to be flexible by simply estimating the interval specific baseline parameters, $\Lambda_{i,k}$.

Unobserved heterogeneity is as mentioned specified by the stochastic variables, v_r, v_o , with F as the joint CDF for the unobserved heterogeneity. For simplicity, it is assumed that the v_r and v_o each can take only two values, where one of the support points in each destination specific hazard function is normalized to zero, because the baseline hazard acts as a constant term in the hazard rates. This specification is flexible and widely applied (see e.g. van den Berg, 2001). The complete contribution to the likelihood function from a migration spell is therefore given by:

$$L = \int \int_{v_r v_o} L(t|x_1, \dots, x_k, \beta, v_r, v_o) dF(v_r, v_o) \quad (8)$$

Van den Berg (2001) includes more details on this class of mixture distributions in duration models.

9 Appendix B

Table 3A and 4A