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Modeling Migration Dynamics of Immigrants

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Tinbergen Institute

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Modeling Migration Dynamics of Immigrants: The Case of The Netherlands

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Abstract

In this paper we analyze the demographic factors that influence the migration dynamics of recent immigrants to The Netherlands. We show how we can allow for both permanent and temporary migrants. Based on data from Statistics Netherlands we analyze both the departure and the return from abroad for recent non-Dutch immigrants to The Netherlands. Results disclose differences among migrants by migration motive and by country of origin and lend support to our analytical framework. Combining both models, for departure and returning, provides the probability that a specific migrant ends-up in The Netherlands. It also yields a framework for predicting the migration dynamics over the life-cycle. From the obtained insight in the dynamic composition of migrants in the country important policy implications can be derived, including admission procedures for different countries and/or migration motives.

JEL classification: F22, J10, C41.
Key words: return migration, migration dynamics, mover-stayer model.

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1 Introduction

The countries of Western Europe, including The Netherlands, have experienced considerable immigration flows over the past decades and have changed from emigration to immigration countries. In the last decade the majority of immigrants came to Europe for family reasons, family reunification and family formation, while in the 1960s and 1970s the migrants were mainly 'guestworkers', invited low-skilled workers. Thus the distribution over the migration motives of the immigrants has changed over the years. Although the motive to migrate have important implications for the migration dynamics, most of the literature do not distinguish the migrants by migratory motive and or they only focus on labor migrants.

The early theories on migration explain the migration flows as a result of wage differentials or through differences in unemployment levels. Given the great and persistent wage and unemployment gaps between most developing countries and the Western World, these conventional migration theories are unable to explain the small size of migration flows and the presence of extensive return-migration. For example, about 20% to 50% of immigrants to the Netherlands leave this country again (CBS 2003). Similar number have been found for other Western European countries, see e.g. Jensen and Pedersen (2007) for Denmark.

Despite the knowledge that many migrations are temporary or repetitive the majority of the literature on migration (implicitly) assumes migrations are permanent. On the other hand, the literature that takes the temporal nature of migration into account by modeling the timing of departure implicitly assumes that in the end all migrants leave, see e.g. Goldstein (1964), Duleep (1994), Dustmann (1995, 2000, 2002) and Constant and Massey (2003). If migration is viewed as an investment decision to maximize human capital and/or earnings over the life-time than return and repetitive migration are not anomalies but common outcomes of a migration decision (see Dustmann (1995, 2000, 2002) and Borjas and Bratsberg (1996)). Although some recent literature has looked into the dynamics of repeat migration (see o.a. Nekby 2006; Constant and Zimmermann 2003) no study has addressed the possibility of both permanent and temporary migration.

The literature on re-immigration and repetitive migration is rather scarce. Constant and Zimmermann (2007) and Massey and Espinosa (1997) study the probability of repeated round

trips between two countries. The optimal life cycle model can also provide suggestions why immigrants who have left the host country re-immigrate again (see Dierx (1988)). With repeat migration the migrant may take advantage of the opportunities in the host and the source country as they appear over time in an optimal way.

The life–cycle theories imply that assimilation in the host country and migration decisions are correlated over time. It is therefore more appropriate to base the analysis of migration on a dynamic model that takes the timing of migration moves into account (Hill (1987) and Dustmann (2002)). In this paper we apply mover-stayer duration models that account for both temporary and permanent stay. We apply these models both on the departure from the Netherlands and the return to the Netherlands of recent non-Dutch immigrants.

Reasons to use durations models are, first, that the longer the stay the more opportunities the migrant has had to learn the language and the culture of the host country. Second, along with the migration decisions other relevant characteristics of the individuals may also change over time, like the labor market status and marital status of the migrant. Third, it is hardly ever possible to observe migration decisions over the whole life time of a migrant. The knowledge that the immigrant has been in the host country from his entry time up till the end, however, contains valuable information. Duration models are very well suited to take these issues into account.

Models for duration data were initially developed in the medical sciences and reliability theory. Duration models or event history models have also been used extensively for demographic analysis, for example in modeling time till birth of first child, time till marriage or time till death. However, the number of empirical analyzes of migration decisions based on a duration model is rather limited and duration analysis of return migration is even more scarce. A few exceptions are Detang-Dessendre and Molho (1999), Longva (2001) and Constant and Zimmermann (2003). Most migration data lack information on the exact timing of the migration moves and only reveal whether the migrant is still in the country at the interview date. Therefore, a more common approach is to estimate a probit or logit model for the probability to return (see a.o., Reagan and Olsen (2000) and Constant and Massey (2003)). In a probit model part of the migration dynamics is discarded because only the whereabouts of the migrants at fixed points in time are

considered. However, the choice of these fixed points has a big impact on the estimation results. It is also not straightforward to include time varying covariates into a probit model.

In conventional duration models it is assumed that in the end all individuals experience the event of interest. That is, all migrants are *movers*. This implies that eventually all immigrants leave the host country. It is, however, very plausible that some of the immigrants never leave. To account for the possibility that some of the immigrants are permanent and some are temporary we use a mover-stayer approach. This approach was developed by Boag (1949) and applied to model the recidivism of criminals (Schmidt and Witte 1989) and labor market transitions (Dunsmuir et al. 1989).[1] Upon using a mover-stayer (duration) model, we can, simultaneously, identify the underlying determinants of the timing of this process and the probability to become a permanent migrant (a stayer). To our knowledge a mover-stayer approach has never been used for modeling the migration dynamics.

For the return from abroad we also use a mover-stayer model. Combining the two mover-stayer models enables us to predict the migration dynamics over the life-cycle for a given cohort of immigrants after the first arrival to The Netherlands. From the stayer probability of remaining in The Netherlands and the stayer probability of remaining abroad (after some time in The Netherlands) we can deduce the long-run proportion of this cohort that ends up in The Netherlands. The intensity to leave and the intensity to return together determine the time it takes to reach this long run proportion.

The data from Statistics Netherlands used in this article have information on the migration motive for recent (1995-2003) non-Dutch migrants. Apart from labor migrants we also consider migrants who come for family reasons, either to join their spouse or to form a new family, and students. It is obvious that migrants who enter for family reasons do not base their migration decision solely on their economic prospects in the new country but also on cultural and emotional aspects. For students a temporary stay abroad may increase their home-country specific human capital. But, on the other hand, completing an education in the host will increase the immigrant's prospects on the host country's labor market.

[1] Schmidt and Witte (1989) use the term 'split-population'model. In the biomedical literature the mover-stayer model is known as the cure-model.

The data further contain information on the timing of migration moves, both on the timing of immigration and on the timing of (return) emigration. This allows us to identify return and repetitive migrants and to estimate the proposed mover-stayer models. Some basic demographics characteristics of the migrants are also available. We restrict our analysis to immigrants who are in the potential labor force at the moment of entry, that is who are between 18 and 64 years of age. Younger immigrants usually migrate with their parents and older immigrants have a high probability to die before they have the possibility to leave.

The outline of the paper is as follows. The next section briefly discusses the recent migration pattern to and from The Netherlands. In this section we also present the conceptual framework for our analysis. In Section 3 we present the data on recent non–Dutch immigrants. Section 4 discusses the methodology of mover-stayers duration models. Section 5 discusses the empirical results both for the departure from the country and the return to the country. In Section 6 we use the estimation results to predict migration dynamics from and to the country over the life-cycle. Section 7 summarizes the results and states our conclusion.

2 Conceptual framework and the context of the Netherlands

In the early 1960s The Netherlands changed from an emigrant to an immigrant country.[2] Immigration follows a European sequence of post World War II and post-colonial immigration, unskilled manpower recruitment and the arrival of refugees. The first period is characterized by the de-colonization of Indonesia in 1949, as a consequence many Indonesian people came to The Netherlands. In the second period, starting in the beginning of the 1960s, a large flow of 'guestworkers', mainly Turks and Moroccans arrived. The Dutch government regulated the recruitment practices by bilateral agreements with the main countries. The total inflow of immigrants reached 235,000 in 1970s. The recruitment policy stopped during the first oil crisis. However, the immigration from the recruitment countries continued as a follow-up migration, first in the form of family reunification and later also family formation. In this period the independence of Surinam also caused large immigration. Starting in the 1980s, immigration is

[2]See Zorlu and Hartog (2001) and Van Ours and Veenman (2005) for a more detailed discussion on the immigration to The Netherlands.

characterized by the family reunification/formation of 'guestworkers'. Additionally, the flow of political refugees, asylum seekers has increased dramatically.

In this paper we analyze the out–migration of recent immigrants (1995-2003) and their possible return from abroad. Below, we briefly discuss the theoretical framework concerning return- (out) and repeated migration. In this discussion we refer to the Dutch migration history and the constitutional rules of migration of the Netherlands. We give special attention to the importance of the migration motive and the country of origin, which are often ignored in the literature.

An important contribution to the theoretical explanations of return emigration of immigrants is provided by Borjas and Bratsberg (1996). They attribute return migration to an optimal residential local plan over the life cycle where immigrants return to source countries due to the realization of a savings goal or due to erroneous information about economic opportunities in the host country. Other theories attribute return migration to region-specific preferences (Hill 1987; Dustmann and Weiss 2007), higher purchasing power of host currency in source countries (Dustmann and Weiss 2007) or to greater returns for human capital acquired in the host country (Borjas and Bratsberg 1996; Dustmann and Weiss 2007). Borjas and Bratsberg (1996) also show that the selection of emigrants from a particular country reinforces the initial selection of immigrants to that country.

Dustmann and Weiss (2007) develop a framework, where the agent maximizes lifetime utility abroad and at home. Lifetime utility includes consumption and locationally fixed factors that are complementary to consumption, including family, culture, climate etc. In this set up preference for the home country leads to return even though it is not necessarily economically advantageous to do so. If the environment and preferences are allowed to change over time, this model can be extended to repeated migration moves.

This framework may differ according to the migration motive, as the importance of economic prospects differ with the migration motive. For migrants following their spouse who migrated to host earlier (family reunion) the decision to re-migrate may not optimal from the individual perspective but only from the household perspective. This also holds for a migrant who came to form a family. As singles are more flexible we expect that those family-migrants are less

mobile and have therefore a lower re-migration rate. As family formation migrants often come to the host to marry or cohabit with a native or second generation migrant the family is even less inclined to move on.

If human capital accumulation is relatively easier in the host country this can motivate a temporary stay abroad. Human capital accumulation can take place both through formal education and work experience. As argued by Co et al. (2000) this accumulation will allow the person to enter the source country wage distribution at a relatively higher point upon return, which even though the source country could have a lower average wage level, will leave the person better off. Following this argument, spending time abroad studying, can be a way of gaining competitive edge. This induces that students would stay temporarily for a short period in the host country. On the other hand, completion of education in the host enhances the migrant's host country specific human capital, thereby facilitating the participation in the host country's labor market. This would reduce the migration rate out of the host country.

Ethnic origin may also matter. The information problem for migrants may be bigger the further, both in distance and in culture, the host and source are apart. Furthermore migrants from further away could possess less host country specific human capital upon arrival. There is a considerable body of evidence that distance matters in deterring migration, see Long et al. (1988). The opportunity cost of remaining in the host are lower for countries close by. For example, Borjas and Bratsberg (1996) find that immigrants to the US tend to return to rich and to countries close to the US. Ethnicity is also important if immigrants of a certain ethnic group systematically perceive a lower return than expected. For immigrants belonging to such groups the re-migrate rate is higher. On the other hand, human capital accumulation in the host may be more in demand in countries similar to the host. For example, for the Netherlands the demand of high-skilled workers in other EU-countries or in the US is relevant for the re-migrate rate of these workers. This may lead to higher return- and re-immigration rates for immigrants from countries close to the Netherlands. Another issue is that immigrants from some countries may find it easier to migrate than other. An example is that citizens of EU-countries are formally allowed to migrate to and to work in other EU-countries. Following this argument EU-citizens should have a higher return and re-immigration rate than none EU-citizens. Specific institutional

policies in the host country could also be important. In the Netherlands, for instance, family formation migrants from non-EU countries have to leave the country if their relation ends within three years of the formation. In addition for labor migrants the end of a temporary contract may induce return migration.

The level of source country network matters as well. For single migrants the availability of potential marriage candidates of the same ethnic origin may change the initial planned duration of stay upward (or to permanent). Even for family migrants an extended ethnic network in the host may increase their duration of stay, as this will increase their possibilities to find a new partner if the relation with their current partner ends. For Turkey and Morocco these networks in the Netherlands seems particularity important. The migrant flows in the sixties and seventies have led to historical ties and a substantial stock of migrants from these countries. Most of the second generation of these migrants still marry to a partner from their home country. We therefore expect that these migrants are more inclined to stay longer in the Netherlands.

A major flaw of our data, described in detail in the next Section, is that the education level of the immigrants is not available, neither the level they attained at home nor the level they attained in the host. Based on the Roy model the literature puts much emphasis on the selection of emigrants due to skill difference. In their seminal article Borjas and Bratsberg (1996) argue that the migrants who return from a host country with low wage dispersion, like the Netherlands, are in majority the more able among the below–average performers in the high wage dispersion source country. Recently, Nekby (2006) finds that return migration from Sweden is positively associated with education. Jensen and Pedersen (2007) find a similar result for the education level obtained in Denmark. However, Constant and Massey (2003) find no effect of home country schooling on the return migration. Edin et al. (2000), who infer the skill level from relative income levels, find that the less skilled are more likely to emigrate from Sweden. A crucial point in this context is whether education and skills acquired at home can be transferred into relevant skills for the host country. This is often not the case between countries with different level of economic development.

We argue that the country of origin in combination with the migration motive serves as a rough approximation of the skill level of the immigrant. The country (group) of origin is an indi-

cator of the level of the host-country specific human capital, since it is from some countries easier to accumulate host-country specific human capital. It is also an indicator of the opportunity certain immigrant groups face abroad. it therefore captures some of the unobserved heterogeneity due to the unavailability of the (home-country) education level. In general immigrants from developed countries bring the highest level of education. It is known that immigrants from Turkey and Morocco have very low education levels. We also know that the home country educational level is a concave function in the age at immigration. We can also be quite sure that most students are highly educated.

To sum up, theory predicts that the migration motive and country of origin are important factors in explaining return- and repeated migration of immigrants. However, only limited empirical evidence on this issue is available. In particular, no analysis has disentangled temporary migration and permanent migration. This study aims to fill that gap.

3 Data on immigrants to The Netherlands

We have data on recent immigration and emigration to and from The Netherlands. Since 1995 we know for all migrants when their migration move took place. All immigration by non-Dutch citizens, immigrants who do not hold the Dutch nationality, who legally entered The Netherlands is registered in the Central Register Foreigners (Centraal Register Vreemdelingen, CRV), using information from the Immigration Police (Vreemdelingen Politie) and the Immigration and Naturalization Service (Immigratie- en Naturalisatie Dienst, IND).[3] The CBS, Statistics Netherlands, has linked these data to the Municipal Register of Population (Gemeentelijke Basisadministratie, GBA). These combined data contain information for all non-Dutch migrants on the timing of migration moves and on some basic demographic characteristics.

All immigrants without the Dutch nationality have to register at the Immigration Police. The people with a nationality that implies a visa to enter The Netherlands, fill in their migration motive when they apply for the visa. Statistics Netherlands make the distinction between labor-migrants, family reunification migrants, family-formation migrants, student immigrants, asylum

[3]The criterion for registration as an immigrant in the Netherlands is a four months time criterion. To be more precise: every person intending to stay in the Netherlands for at least two thirds of the forthcoming six months, should notify the local population register immediately after the arrival in the Netherlands.

seekers (and refugees), and immigrants for other reasons (including a.o. joining with labor migrant, medical treatment and Au Pair). There are different requirements for different visas. Migrants from the EU are free to move and work in the Netherlands, but still need to register. Labor migrants from other countries need to have a labor contract before they can enter the country. Employers can only hire somebody from outside the EU if they can prove they cannot find a suitable native person or from the EU. For migrants who come for family reasons the person they are connected to in the Netherlands must have a sufficient income, must be above 18 (21 for family formation) and have living permission or the Dutch nationality. For family reunion a legal marriage or living–together–contract should exist. Family formation migrants are expelled from the country if their relation ends within three years. Students need to prove acceptance at a Dutch university or college before they are allowed to enter.

The migration motive is only available for those immigrants who are still registered at the end of each year, starting 1997. Thus, the main migration motive for non-Dutch immigrants is not available for those immigrants that leave, die or naturalize before January 1st 1998 or before the end of the year of arrival. With these data we can identify important groups of immigrants to the Netherlands. The distribution of the non–Dutch immigrants aged 18-64 over the migration motives at first arrival to The Netherlands is depicted in Figure 1. Figure 2 shows the development of the absolute numbers of immigrants over the years 1995 till 2003.[4]

From 1995 till 2001 the number of immigrants increased every year. In 2001 69,000 non-Dutch immigrants between 18 and 64 years of age entered The Netherlands. In the last two years the inflow of immigrants decreased to 57,000 in 2003. This decrease is most probably induced by two phenomena. First, the more strict asylum policy of the Dutch government has reduced the inflow of refugees from 15,000 in 2000 and 2001 to 5,000 in 2003. Second, the downfall of the Dutch economy has led to a reduction in the number of labor immigrants. In the last 10 years family-formation has been the most important reason to migrate to The Netherlands (26%). Labor migrants (23%) and refugees (17%) are also important groups. Because the migration motive is unknown for the immigrants that leave the country in the same year they entered we have a relatively large number of immigrants with unknown migration motive.

[4]For more information on these data see Zorlu et al. (2004) and Nicolaas et al. (2004)

We focus our analysis on four migration motives: labor, family reunion, family formation and study. Asylum seekers are removed from the sample because many of them are not immediately registered in the Municipal Register of Population. Most of the asylum seekers are only registered after they have received a living permission. It can take up to eight years until a living permission is granted. Thus, the registered time in The Netherlands for asylum seekers is smaller than the true duration in the country. Another issue is that some asylum seekers have a temporary permit to stay, awaiting a permanent permit. If the permanent permit is not granted the asylum seeker may be expelled from the country. Then, return migration is an exogenous event which is not based on an individual decision.

The immigrants with other reasons to enter come for a plethora of reasons and therefore they comprise a very heterogeneous group. The analysis would tell little about the migration dynamics of a individual member of this group. Besides, they only amount to 7% of all immigrants. This made us decide not to include these immigrants in the analysis sample and focus on the remaining four groups of immigrants.

In Table 1 we present some descriptive statistics for the data. Family formation migrants and, of course, students are younger than other migrants. Labor migrants are mostly men, while migrants who come for family reasons are mostly women. The difference between family reunion immigrants and family formation migrants seems small, as both for both about 40% is married. Many family reunion migrants are cohabiting and many family formation migrants get married before they enter the country (because it can take more than half a year to get the visa). Family reunion migrants are follow-up migrants from earlier labor and asylum migrants, while family formation migrants are hardly follow-up migrants. Marriage to either natives or second generation Turks and Moroccans are the main source of family formation migration.

Labor migrants and students are hardly ever married. The main countries of origin for each migration motive are very distinct.[5] The majority of labor migrants originates from a country

[5]EU15/EFTA are countries in the European Union, except for the 2002 new members and except for Belgium, Germany, UK and France plus the member countries of EFTA: Switzerland, Norway, Iceland. Former Yugoslavia are Croatia, Serbia & Montenegro, Macedonia and Bosnia. New EU members are the countries that joined the European Union in 2004: Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovenia and, Slovakia. Rest of Asia are countries in Asia not Turkey, China, Iraq, Iran or Afghanistan. Rest of Africa are all countries in Africa except Morocco. Latin America are all countries in the Americas except USA and Canada. Australasia are Australia, New Zealand and other countries in the pacific

in the European Union. USA/Canada are other important countries of origin of labor migrants. Family reunification migrants follow their labor migrants and therefore the EU15/EFTA region is also an important region of origin for these migrants. Although Turkey and Morocco have lost their importance as origin of labor migrants, the family reunion from these countries is still important. The relatively high percentage of family reunion migrants from Iraq, Iran and Afghanistan and other Asian countries is induced by reunification of asylum seekers. The fact that second generation Turks and Moroccans get their partner from their home country is reflected in the importance of these countries of sources for family migrants. As natives get their foreign spouse mainly from Asia, Africa and Eastern Europe, these regions are important regions of origin for family migrants. Finally, students origin mainly from EU countries, Asia (China in particular) and Africa. Note that the relatively large number of immigrants from Surinam is not reflected in the table because many of them have the Dutch nationality and in this article we focus on the non-Dutch immigrants only.

Table 2 summarizes the dynamic aspect of migrantion. The average observed duration of stay in The Netherlands is the longest for family reunification migrants and the shortest for students. Of all labor migrants and students that arrive between January 1995 and December 2003, about 45% has left the country by the end of the observation period, December 31st 2003. For migrants who came for family reasons less than 20% has left the country. A substantial share, 6%–14%, of the migrants that have left the country returns to The Netherlands again within the time frame. Those migrants who re-immigrate are very often repetitive movers, as, for example, a third of re-immigrated labor migrants leaves the country again. These simple descriptive statistics give an under-representation of the migration dynamics, because the recent cohorts of immigrants are only followed for a very short period of time. When we only look at the immigrants arriving in 1995 in The Netherlands, we observe that almost 40% of the immigrants from that cohort have left the country within 7 years, see also Alders and Nicolaas (2003b) and Nicolaas and Sprangers (2004).

4 A Duration Analysis of Migration Dynamics

In a duration model the timing of a particular event (or recurrent event) is modeled. For many economic and demographic phenomena the timing of a transition from one state into another state is important, see a.o. Lancaster (1990) and Van den Berg (2001). A very obvious reason to use duration models for migration dynamics is that the timing of the migration events, emigration or immigration, is relevant in understanding the migration. It is very likely that the assimilation of the migrant in the host country depends on the length of stay in that country. That will influence the decision to leave. Another reason to apply duration models is that many relevant characteristics of the migrant may change over time. In duration models it is straightforward to incorporate time-varying variables. A final reason to use duration models is that in our data on newly arriving immigrants to The Netherlands we only observe the in- and outflow of migrants from January 1995 till December 2003. For the migrants still in The Netherlands in December 2003 we do not know their complete length of stay in the country. We only know their migration history up till December 2003. This still contains valuable information and duration models are perfectly fit to exploit the information of such right censored durations.

The key variables in duration analysis are the duration till the next event, the length of stay of the migrant in The Netherlands, and the indicator of censoring. In duration analysis the intensity, the hazard rate, is usually modelled.[6] In the study of migration dynamics, the intensity gives the instantaneous probability of leaving the country at a duration t months, given that the individual stayed in the country for at least t months with $\lambda(t) = \frac{f(t)}{S(t)}$ where $f(t)$ is the probability density function, and $S(t)$ is the survival function. The intensity is invariant to censoring.

A common way to accommodate the presence of observed characteristics is to specify a proportional intensity model $\lambda(t|X) = \lambda_0(t)\exp(\beta' X_i(t))$, where $\lambda_0(t)$ represents the baseline intensity, that is, the duration dependence of the intensity common to all individuals. The covariates affect the intensity proportionally, see Cox (1972). The survival function for this model is $S(t|x_i) = \exp\Big(-\int_0^t \lambda_0(s)e^{\beta' x_i(s)}\,ds\Big)$.

[6] In the biomedical literature the accelerated failure time that models the log-duration is also often used. In these models is it more complicated to account for censoring.

4.1 Mover-stayer models

Up to this point we have assumed that all migrants are (potential) *movers*. We now account for the possibility that some migrants never make a next migration move, they are permanent migrants, by using a mover-stayer approach. A mover-stayer model (see Schmidt and Witte (1989)) assumes that a latent group of individuals have a zero probability to leave, the *stayers*. To incorporate the possibility of defective risks the survival function is redefined as

$$S(t|x_i) = \big(1-p\big)\exp\Big(-\int_0^t \lambda_0(s)e^{\beta' x_i(s)}\,ds\Big) + p, \tag{1}$$

where p is the proportion of stayers. Thus the survival function at t is given by the proportion of stayers (permanent migrants), who never leave the country, plus the proportion of movers (temporary migrants) multiplied by the probability to migrate after a duration of t months in the country. It is important to realize that who is a stayer or who is a mover is not observed. We only know that those who move are movers, but those who are at a given duration still in the country are a mixture of stayers and movers who will leave later. In the end (i.e. $t \to \infty$) only the stayers remain. The proportion of stayers can also depend on observed characteristics of the migrants. To guarantee that the proportion lies between zero and one we employ a logit form: $p(z_i) = \exp(\gamma' z_i)/\big(1+\exp(\gamma' z_i)\big)$. Note that the interpretation of the regression coefficients β change. The coefficients are no longer equal to the elasticity of the intensity w.r.t. the covariates. In the mover-stayer model the regression coefficients give the elasticity of the conditional intensity, conditional on being a mover. The unconditional intensity is now

$$\lambda(t|x_i) = \frac{\big(1-p(z_i)\big)\lambda_0(t_{ij})e^{\beta' x_i(t_{ij})}\exp\Big(-\int_0^t \lambda_0(s)e^{\beta' x_i(s)}\,ds\Big)}{\big(1-p(z_i)\big)\exp\Big(-\int_0^{t_{ij}} \lambda_0(s)e^{\beta' x_i(s)}\,ds\Big) + p(z_i)} \tag{2}$$

Many parametric functional forms exist for the baseline intensity. However, they all put heavy restrictions of the shape of the baseline intensity. A more flexible approach is to assume a piecewise constant baseline intensity. Let the intervals $I_m(t) = (t_{m-1} \le t < t_m)$ for $m = 1, \ldots, M+1$ with $t_0 = 0$ and $t_{M+1} = \infty$ be the intervals on which we define the piecewise constant intensity. Then, the baseline intensity is $\lambda_0(t) = e^{\alpha_0} \cdot \Big(\sum_{m=1}^{M+1} e^{\alpha_m} I_m(t)\Big)$, with $\alpha_{M+1} = 0$. Thus α_0 determines the intensity in the last interval. The other α's determine the difference in intensity at each interval compared to this last interval. The baseline intensity for a duration of

$t \in [t_{m-1}, t_m)$ is higher than the baseline intensity to leave for a duration of $t > t_M$ if $\alpha_m > 0$ and lower if $\alpha_m < 0$.

If there is interdependence of the repeated migrations due to omitted covariates or individual-specific effects, like being adventurous, the parameter estimates may be biased and/or the estimated covariance matrix provides invalid standard errors. One approach is to explicitly model the individual-specific effects using unobserved heterogeneity. In Cox survival models this kind of model is called the mixed proportional hazard model, see for example Manton et al. (1981).

We attempted to fit both Gamma and discrete mixture models with either shared or unshared, differs unobserved heterogeneity. Shared unobserved heterogeneity assumes that the heterogeneity term remains the same for each migration of one individual, while unshared unobserved heterogeneity assumes that it differs for each migration of one individual. None of these models lead to an indication of unobserved heterogeneity or change in the parameters. We therefore do not present these models. The absence of unobserved heterogeneity in the model for leaving the host and in the model for returning to the host rule out that both types of behavior are correlated through unobserved characteristics. It is, however, important to point out that the presence of stayers is compatible with a discrete mixture duration model. Heckman and Walker (1987) recognize that some specifications of the latent intensity can deliver stayers. This renders the interpretation of the coefficients (and the baseline intensity) conditional on being a mover. The temporal dependence between the time in the Netherlands and the time abroad is captured by including an indicator of repeated migration combined with either the time abroad (for departure from the Netherlands) or the years spent in the Netherlands during the previous stay (return to the Netherlands).

4.2 Additional left–censoring and left–truncation

Before estimating the mover-stayer models some data issues should be mentioned. Although in principle the exact date of emigration (and second and repeated immigration) is known, some migrants do not officially inform that they leave. Their departure is only registered as "administrative removal" after the authorities have assessed that the migrant has left the municipality without showing up in the files of another municipality in The Netherlands or as an emigrant.

These administrative removals are included among emigration and they amount to around 40% of the emigration, see Alders and Nicolaas (2003a). It is quite possible that some migrants that are "administratively removed" remain in The Netherlands as an illegal immigrant. However, an indication that "administrative removal" is not only induced by people who try to stay illegally in the country is that many Dutch nationals also administrative removed.

We assume that an administrative removal implies that the migrant has left before the date the administrative removal is recorded and instead of the true duration we measure the upper bound of the duration of stay. Such limited information is equivalent to *left-censored* data. For left-censored data the exact start of a duration is unknown, but it is known that the duration started after some observed time. Then the contribution to the likelihood of a left-censored duration of length t is the probability the migrant has stayed at most t. This is equal to one minus the survival probability up to t months of this migrant, see Appendix A.

Another data issue concerns the observation of the migration motive. The migration motive is unknown for immigrants that entered the country between January 1995 and December 1997 and left the country before January 1998. This implies that the sample of immigrants that came to The Netherlands in that specific period for whom we observe the migration motive is conditional on 'survival' up to January 1998. In a duration model this is called *left truncation* and by conditioning on 'survival' from the date of entry till January 1st, 1998 we account for this selective observation. The migration motive is also unknown for the immigrants that leave the country before the end of the year. This implies that the immigrants with known migration motive have 'survived' up till the end of the year. Again, conditioning on the time till the end of the year will correct for this selective observation. However, for immigrants that enter the country in the last year of observation, 2003 the time till the end of the year equals the observed duration and we cannot correct for this selection. We, therefore, exclude the immigrants that arrived in 2003 from our analysis. The full likelihood function is given in Appendix A.

5 Empirical Findings

We consider three models: (1) a conventional duration model without stayers; (2) a mover-stayer model; (3) a mover-stayer model with interaction terms. In Model 2 and 3 the stayer

probability changes with gender, migration motive and country of origin. We assume that the stayer probability is determined at the moment the migrant enters the country. Thus, for the time-varying variables age and marital status we include only the value at the moment of entry in the host (or abroad). A comparison between the first two models indicates the importance of permanent migration (stayers). In Model 3 we allow for a separate baseline intensity for each migration motive. In Section 2 we have shown that the impact of ethnic origin on the migration dynamics may differ with the migration motive. Therefore, model 3 also allows for interaction between migration motive and country of origin. First, we discuss the empirical results for the models for immigrant departure from the Netherlands. Next, the results for the return from abroad for those immigrants that have left the country are discussed. In Section 6 we combine the two model 3 results to simulate the migration dynamics of some typical immigrants to the Netherlands.

5.1 Departure from The Netherlands

The mover-stayer models contain two components, the baseline intensity and the stayer-probability. Table 3 with the estimation results is divided into three parts. The first two parts provide the parameter estimates of the intensity to leave and the last part provides the logit coefficients estimates of the stayer-probability. The stayer probabilities implied by the parameter estimates of model 3 are shown in the first panel of Table 5.

We have tried a couple of different interval choices for the piecewise constant baseline intensity and decided to use eleven intervals, one interval for every half a year till 5 years (and the reference interval of 5 years and over). The number of intervals is a compromise between flexibility and interpretation. The implied baseline intensities for model 3 are depicted in Figure 4 (conditional on being a mover) and Figure 5 (unconditionally, see (2)). Note that due to different stayer-probabilities (see the last part of Table 3 and Table 5) the conditional baseline intensity of family formation migrants is above the conditional baseline intensity of labor migrants (the first 18 months), while the opposite holds for the unconditional baseline intensity. Family formation migrants have a much higher stayer probability (about 70%). This dynamic sorting is equivalent to the induced duration dependence if one neglects existing unobserved

heterogeneity.

The baseline intensity provides an indication of the assimilation and attachment to the home country of the immigrants. Assimilation is usually defined as a cumulative learning process and it therefore increasing over time. Attachment to the home country can be either decreasing over time, as migrants may be unable to develop personal relationships in the host, or increasing over time, as ties with the home country diminish. We cannot distinguish between these two factors. The learning takes place during the first two years of stay as for all migrants we see a sharp decline in the departure rate during this period. After this period the departure intensity declines only a little, indicating the attachment and assimilation equalize. However, other factors as temporary contracts (labor), end of study (students) or change in family may also cause this pattern.

Students and labor migrants are more flexible than family migrants, because they are mostly single. Their migration decision is therefore less complicated, which is reflected in their high departure rate. Students show the least attachment to the Netherlands and leave fast. Only 20% of the students have either got a job and/or found a partner and decided to remain in the country. The family reunion migrants show the lowest departure rate. And, when we take the high percentage of stayers into account, the family formation migrants also have a very low departure rate. Family formation migrants have to stay with their spouse for at least three years to gain an individual living permission in the Netherlands. This is reflected in a lower departure rate for those migrants after 3 years of stay.

The influence of the country of origin, gender, age (centered at the average age of 25 years and divided by 10 and in a quadratic form) and, repeated migration on the departure intensity are given in the second part of Table 3. We present only the results for a selection of the used countries/regions of origin.[7] The European Union/EFTA (excluding the neighbor countries Belgium, Germany, France and UK) is reference region of origin. We see that the effect of the covariates on the intensity differ in magnitude among the different migration motives. As expected married migrants are less mobile than single migrants. The need to make joint decisions makes a couple less flexible. The age pattern of the intensity of labor migrants is similar to the

[7]The parameters for other countries of origin can be obtained from the author upon request.

empirical finding in the literature that both the younger and the older leave faster than those in their prime of their working age (35 year old). For family formation migrants the age pattern of the intensity to leave increases with age. A reason may be that older family formation migrants have accumulated more source specific human capital which could make it optimal for them to return.

We have discussed already that the assimilation effect is captured by the baseline intensity. However, migrants who come for a second time to the country have already accumulated host country specific human capital. We therefore include an indicator of repeated migration and the length of the previous stay in the model. The effect of migration experience is often attributed to an unobserved propensity to move and to a lower opportunity cost of moving if the migrant has less location–specific (human) capital. However, migration experience also implies a larger accumulated information about the host country's opportunities and therefore a higher assimilation and a greater attachment to the host. We find that the latter explanation is more plausible for the Netherlands. The quadratic form implies that 'assimilation' declines in the first months till a 'minimal' length of stay is reached, and then increases with the length of stay.

The country of origin is a very important factor in explaining the migration dynamics. The effect of the country of origin on the intensity can not be compared separately from the effect on the stayer probability. The stayer probability or probability to remain in the Netherlands is the third component of the mover–stayer model. The logit coefficients of this probability are given in the last part of Table 3.

The migrants from neighboring countries Germany and the UK show rather opposing migration dynamics. Despite the fact that the German culture is closer to the Dutch culture migrants from Germany remain more often in the Netherlands and when they leave they leave slower. It seems that Germans feel more at home in the Netherlands than the British. Migrants from the new EU countries also remain more often in the country. However, labor migrants from these countries are more mobile. Note that these migrants entered before the free-movement of people from these accession-countries to the Netherlands came into force. Two possible reasons for these higher dynamics are, first, that these migrants use the Netherlands as a stepping stone for an international career and, second, as their home-countries experience fast development they

return home. This should be a point of concern for the Netherlands, as the need for employers in agriculture (seasonal) and construction is growing and the ambition to work in these sectors is declining among natives. In recent years (2006-2008) the inflow of migrants from these accession countries increased, especially from Poland, but if the Netherlands cannot retain these migrants labor supply shortage in the these sectors is expected. American migrants, who are also close (in culture) to the Netherlands, remain much less in the country. These, mainly high-skilled, workers face an international job-market and are therefore less attached to the Netherlands.

Migrants from countries further away show a tendency to remain in the country. Migrants from Turkey and Morocco have a large ethnic network in the Netherlands, this increases their attachment to the country despite their different (islam) culture. The family formation migrants from these countries that leave do it faster. These migrants are mainly low-educated people from the rural areas of these countries (often to assist cousins to come to a Western country), with a very different culture compared to the Western society. Another reason for the faster return is that those migrants are expelled from the country when their relation breaks up within 3 years. Migrants from China, mostly students, seem to take the opportunity to enhance their human capital and use it in the Netherlands.

The stayer probabilities implied by the parameter estimates of model 3, for a typical migrant for each migration motive, are shown in the first panel of Table 5. For labor migrants this reference migrant is 30 year old single male from an EU15 or EFTA country, for family reunion migrants it is a 30 year old married female from Turkey, for family formation migrants it is a 29 year old unmarried female from Turkey and, finally, for the reference student migrant is a 21 year old single male from an EU15 or EFTA country. More than $\frac{2}{3}$ of the family migrants remain in the country, while only $\frac{1}{4}$ of the labor migrants and $\frac{1}{5}$ of the students stay permanently. It shows that the importance of including both temporary and permanent migrants depends on the migration motive.

5.2 Return to The Netherlands from abroad

About 16% of the migrants arriving in 1995 in The Netherlands leave the country and return before the end of 2003. Thus, even in this relatively short period of nine years, repeated migra-

tion is an important phenomenon. For a full coverage of the migration dynamics understanding the speed of return, if they return, of migrants abroad who first spent some time in the country is imperative. In our data we only observe the migrants while officially registered in The Netherlands. Therefore, we cannot include home country characteristics, like the wage differential with the Dutch wages or unemployment level, in the model to explain the return to The Netherlands. However, if the migrant returns we observe the exact time of this new entry to the country and we can link this with the earlier information on this migrant. If the migrant has not returned within the observation period, (s)he may stay abroad or return later. This information is rich enough to allow the estimation of mover-stayer models for returning to The Netherlands from abroad.

For the return of recent immigrants to The Netherlands we also estimate three models; a conventional duration model without stayers, a mover-stayer model and, a mover-stayer model with interaction terms. The results are presented in Table 4. Again the table is divided into three parts. The first two parts provide the parameter estimates of the intensity to return and the last part provides the parameter estimates of the stayer-probability (of staying abroad).

We have tried a couple of different interval choices for the baseline intensity and decided to use five intervals. These intervals are the first 6 months and, every half a year till 2 years (and the reference interval beyond 2 years). We present the results in Table 4. The implied baseline intensities for model 3 are depicted in Figure 6 (conditional on being a mover) and Figure 5 (unconditionally). The intensity to return from abroad is much less then the intensity to leave. This intensity decreases with the length of the time the migrants are abroad, which indicates that the attachment to the Netherlands is decreasing over time. Students have the highest intensity to return (conditional of being a mover), but if you take the high percentage of students that never return into account they have the lowest return intensity. Thus, they just come to the country to study and use their obtained education in other countries. In line with the assimilation theory we find that migrants who have been in The Netherlands before have a higher intensity to return.

The influence of the country of origin on the return intensity are given in the second part

of Table 4.[8] Again the effect of the country of origin on the intensity can not be compared separately from the effect on the stayer probability, see the third part of Table 4. Migrants from neighbor countries have closer ties and therefore the opportunity cost of returning is lower. Migrants from Turkey and Morocco also return more often. For those migrants the existing network of countrymen in the Netherlands must induce this.

The probability to remain abroad implied by the parameter estimates of model 3, for a typical migrant for each migration motive, are shown in the lower panel of Table 5. Students do not return to the Netherlands for a second time, while family formation migrants often just go temporarily abroad. About $\frac{2}{3}$ of the labor migrants and $\frac{3}{4}$ of the family reunion migrants returns to the Netherlands again. A reason for family migrants to return is that their partner is still in the Netherlands. Unfortunately, the data does not provide us the partner identification. Thus we cannot tell how often this occurs. A changing environment, either at home or in the Netherlands can induce labor migrants to return. The host specific human capital they accumulated during their previous stay facilitates their chances on the Dutch labor market. As discussed above the stayer probability also depends heavily on the country of origin of the migrant. Note that, although a substantial amount of (non-student) migrants return to the Netherlands again, the intensity to return is rather small.

6 Predicting Lifetime Migration Dynamics

In the previous section we have discussed the estimation of mover-stayer models for both the departure from The Netherlands and the return from abroad back into the country. Some of the migrants move back and forth, while other stay in The Netherlands or stay abroad (after some time spend in The Netherlands). Migrants that repeatedly move back and forth can, each time they enter, become a stayer. The intensity to leave determines how long the 'movers' stay in the country. After they have left the country they either become a stayer abroad or return to The Netherlands again. The intensity to return determines how long these 'movers' stay abroad. At their, possible, second entry to the country they can become a stayer or a mover. In principle

[8] We present only a selection of countries of origin included in the models. The full estimation results are available from the author upon request.

this could repeat again and again.

Thus, the estimated stayer-probability to stay in The Netherlands underestimates the true proportion of migrants that end-up in the country. This proportion can be derived from the limit proportions of the implied Markov Chain of the combination of both mover-stayer models. This Markov Chain consists of with two states, the migrant is in The Netherlands or the migrant is abroad. If the probability to stay permanently in The Netherlands is denoted by $P_{i,\mathrm{NL}}$ and the probability to stay permanently abroad is denoted by $P_{i,\mathrm{ab}}$, both conditional on the observed characteristics of the migrant available in our data, the long run probability to end-up in The Netherlands is

$$\pi_{i,NL} = \frac{P_{i,\mathrm{NL}}}{P_{i,\mathrm{NL}} + P_{i,\mathrm{ab}} - P_{i,\mathrm{NL}} \cdot P_{i,\mathrm{ab}}}. \tag{3}$$

These implied long-run probabilities for a typical migrant for each migration motive are shown in Table 6. A majority of the family migrants, about half of the labor migrants and $\frac{1}{5}$ of the students ends-up in The Netherlands. Next to the migration motive gender, marital status and the country of origin play an important role in the size of the long-run probability.

Females and married migrants have a higher chance to end up in the the Netherlands, because they are less prone to move while in the Netherlands and more prone to return to the Netherlands. Migrants from Turkey and Morocco, which are mostly family migrants, end up in the country very often. The existing network of countrymen makes it relatively easy to find their way in the country, even though their assimilation rate is rather low (low language fluency and high unemployment rates). Chinese students seem to take the opportunity to remain in the country after completion of their education.

The importance of repeated migration can be derived directly from the stayer probabilities $P_{i,\mathrm{NL}}$ and $P_{i,\mathrm{ab}}$. In the long-run the probability to return to the country at least once is equal to $\big(1-P_{i,\mathrm{NL}}\big) \times \big(1-P_{i,\mathrm{ab}}\big)$. Consider, for example, a cohort of unmarried male labor migrants from Turkey entering The Netherlands. From this cohort 85% ends-up in the country (see Table 6). Before they settle down forever, these migrants may have gone abroad temporarily. At first entry 48% of these Turkish migrants become a stayer (see upper panel of Table 5). The remaining 52% leave the country and 16% of them never return to the country (see lower panel of Table 5). Thus, $44\% = 52\% \times 84\%$ of the original cohort eventually enters the country again. From

those Turkish migrants that enter again 48% decide to stay in The Netherland, etc.

The time it takes to reach the long-run proportion depends on the intensity to leave and on the intensity to return from abroad. With the estimated stayer probabilities and the estimated intensities to leave and return we can predict, for any cohort of migrants, the migration dynamics after the first entry to The Netherlands. The prediction is based on simulation of a hypothetical cohort of immigrants using the estimated coefficients of model 3 for both leaving and returning.

For the simulation we choose a fixed combination of covariate values (except for the endogenous repeated migration indicator and the previous time in the country/abroad) and consider 10000 of such (hypothetical) migrants, e.g. 10000 unmarried 30 year old male labor migrant from an EU country, who enter the country at the same time. Then, based on their implied stayer probabilities, we simulate which of these migrants become a stayer in the country. Then for the movers we simulate for each month whether the migrant leaves or not. When a (simulated) migrant leaves we simulate whether (s)he remains abroad forever or stays abroad temporarily. If the migrant does not remain abroad we simulate the return on a monthly basis. If a (simulated) migrant returns to the country we simulate whether (s)he remains in the country, etc. In second and higher order migration moves we take the previous durations into account. We stop simulating after 25 years (300 months). We repeat 100 of such simulations and take the average percentage of the original cohort in the country at each month after entry to construct our prediction.

We predict the migration dynamics for a typical immigrant for each of the four migration motives (see the choice of the typical migrants in the previous section). From Figure 7 it is clear that not only does the final percentage of the cohort that ends-up in The Netherlands differ but also the pattern to this long-run probability. The students and family reunion migrants reach their long-run probability relatively fast, while for the labor-migrants and family formation migrants the long-run probability has not been reached within 25 years after entry. Thus, students seem to decide rather fast whether to invest in staying in the Netherlands or use the obtained education somewhere else. A small part of the labor migrants seem to foresee new opportunities in another country (or in a country they once were) and continue to revise their migration decision.

Thus, migration is for some a continuously dynamic process in which the migrant repeatedly moves to and from a country, while for others it is a one-shot irreversible decision. Of course, for many the migration dynamics is somewhere in between these extremes. For a complete view of the migration dynamics it is therefore important to allow for both permanent (stayers) migrants and temporary (movers) migrants. The analysis of this section also shows that both the departure and the return should be considered for a full coverage of the migration dynamics.

7 Conclusion

Most previous studies treat migration as a once-and-for all event and the studies that take the return migration into account neglect the fact that a some migrants remain in the host country. For a dynamic analysis of migration from a life-cycle perspective both temporary migrants, who leave the country and who may return or who make repetitive moves, and permanent migrants, who stay forever in the host country, are important. In this paper a coherent modeling approach is developed that includes both temporary and permanent migrants and both out-migration and re-immigration.

Another contribution of this paper is that it provides insight in the difference in migration dynamics by migration motive. Most of the literature has focused on labor migrants, but the other migration motives are equally important. The decision to (re)-migrate may be less based on economic grounds for family migrants and more on emotional and cultural factors. For example, many import brides in the Netherlands are migrating to form a family with a native or second generation migrant. For many of these migrants their individual economic prospects are of minor importance in their migration decision.

By applying a mover-stayer model for the dynamic process of migration we can identify the underlying determinants of the timing of this process, both for the timing of departure from the host country and for the timing of the return from abroad back to the host country. It also enables us to identify the characteristics of the migrants that influence the probability to become a stayer (permanent migrant) in the host country or abroad.

Our empirical results based on data for recent non-Dutch immigrants to the Netherlands provide compelling evidence that some immigrants to The Netherlands are permanent, while

other immigrants are prone to leave again. The estimation results show important differences in the stayer probability and the intensity of departure by migration motive and by country of origin of the migrant. Labor migrants have the highest mobility rate and family migrants the lowest. Labor migrants from Western countries migrate more than labor migrants from countries further away (both in distance and culture). For the first less institutional restrictions to migrate exist and they are usually highly educated, while for the latter it more difficult to migrate and assimilation into the country requires more effort. Not surprisingly, most students come to the country for a temporary stay and when they leave they hardly return. However, Chinese students seem to use their obtained education rather often in the Netherlands, as they show a high permanent stay probability. Family formation migrants are the least prone to leave (and return very frequently from abroad). Many of these migrants originate from Turkey and Morocco, countries with a large ethnic network in the Netherlands due to guestworker agreements in the 60s and 70s of the previous century. The migration dynamics of migrants from these countries

By combining the stayer probabilities for remaining in the host country and remaining abroad the long-run probability to end-up in the host country can be deduced. Some of these migrants become a stayer at their first entry in the host country, while temporary migrants leave after some time. Of those migrants that have left, some stay abroad and some return to the host country again. In the long-run the migrant ends-up in the host country or abroad. The combined models also provide a framework to predict the migration dynamics to and from The Netherlands of a particular cohort of immigrants. The intensity to leave determines how long these migrants stay in the country. The intensity to return determines how long these migrants stay abroad. Thus, for a complete view of the migration dynamics it is important to allow for both permanent (stayers) migrants and temporary (movers) migrants and that return from abroad should not be neglected.

From the obtained insight in the dynamic composition of immigrants in the country important policy implications can be derived. Consider, for example, the recent increased restriction on family formation migration to the Netherlands. The Dutch government has increased the minimum age of the migrant and the minimum income of the partner in the Netherlands and

now requires a proficiency test of these migrants. The impact of such measures will not only be a reduction in the inflow of family migrants (from non-Western countries) but also, in the long-run, a major reduction of the number of these migrants living in the country. The latter can be directly derived from our results. Other possible policy measures for the Netherlands should be aimed at retaining the (mostly highly-educated) labor migrants and students from Western countries in the country. Similar stories can be derived for other European countries.

A drawback of the used data is that it lacks information on important factors that influence migration decisions. In the future we hope to link the current data to data on socio-economic characteristics of immigrants. Statistics Netherlands is building a huge dynamic individual based database on social-economic variables, the SSB (Social Statistisch Bestand= Social statistical database), that can be linked to the current data and many other data at Statistics Netherlands. With the linked data it would be possible, for example, to infer how the labor-market status of migrants in The Netherlands affects their migration dynamics.

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A Likelihood function

In this appendix we present the full likelihood of the mover-stayer model with adjustment to the data issues of left–censoring and left–truncation. We assume that the process of leaving the host and returning back to the host are, apart from the indicator of repeated migration, independent. Thus the parameters of these processes are estimated independently. The data issues have, however, a different effect on the likelihood and we therefore present both the likelihood of leaving the host and of returning to the host.

A mover-stayer model assumes that a latent group of individuals have a zero probability to leave, the *stayers*, while the *movers* eventually leave according to their intensity to leave. With probability p the individual is a stayer and with probability $1-p$ the individual is a mover. The survival function of a mover-stayer model is

$$S(t|x_i) = \big(1-p\big)\exp\Big(-\int_0^t \lambda_0(s)e^{\beta' x_i(s)}\,ds\Big) + p, \tag{A.1}$$

We assume that the probability to be a stayer depends on observed characteristics of the migrants through a logit form: $p(z_i) = \exp(\gamma' z_i)/\big(1+\exp(\gamma' z_i)\big)$. A migrant may have multiple spells (both in the host and abroad). Let k_i^h be the number of spells in the host and k_i^a the number of spells abroad for individual i. Note that k_i^a is equal to k_i^h if the migrant is abroad by the end of the observation period and is equal to $k_i^h - 1$ if the migrant is in the host by the end of the observation period. The end of the observation period induces right-censoring, but only for the last spell. Let $\delta_{ij} = 1$ if the j^{th} spell of individual i is censored and otherwise $\delta_{ij} = 0$. Without the additional data issues the likelihood contribution of migrant i (both for leaving, $m = h$, and returning, $m = a$) is

$$\begin{aligned} l_i^m \;=\; & \prod_{j=1}^{k_i^m}\Bigg[\big(1-p(z_i)\big)\lambda_0(t_{ij})e^{\beta' X_i(t_{ij})}\exp\Big(-\int_0^{t_{ij}}\lambda_0(s)e^{\beta' X_i(s)}\,ds\Big)\Bigg]^{(1-\delta_{ij})} \\ & \times\Bigg[\big(1-p(z_i)\big)\exp\Big(-\int_0^{t_{ij}}\lambda_0(s)e^{\beta' X_i(s)}\,ds\Big) + p(z_i)\Bigg]^{\delta_{ij}} \end{aligned} \tag{A.2}$$

In Section4.2 we discussed three data issues that lead to additional censoring and truncation. We first focus on the implications for the model for leaving the host. The first data issue is that some emigrations are recorded as an administrative removal. We assume that this implies left–censoring. Then the contribution to the likelihood of a left-censored duration of length t is equal to one minus the survival probability up to t months of this migrant.

The second and third data issue are both related to the observation of the migration motive. The migration motive is unknown for immigrants that entered the country between January 1995 and December 1997 and left the country before January 1998. It is also unknown for the immigrants that leave the country before the end of the year. These issues both imply that the duration is only observed if the migrant is still in the host after either January 1998 or the end

of the year of arrival. This *left truncation* of the duration can be accommodated by conditioning on survival up to those dates.

To formally account for the three issues mentioned we introduce some extra notation. Let a_{ij} indicate whether the j^{th} emigration of migrant i was due to an administrative removal ($a_{ij} = 1$). Let $\delta_{i,98} = 1$ if migrant i arrived before 1998 (and stayed at least till 1998 in The Netherlands). Then $t_{i,98}$ is the duration till January 1$^{\text{st}}$, 1998 for those migrants with $\delta_{i,98} = 1$. Similarly, let $\delta_{i,e} = 1$ for the first entry of migrant i to the country (conditional on arrival in 1998 or later) and let $t_{i,e}$ be the time till the end of the first year of entry. Then the likelihood contribution of migrant i to the likelihood of leaving the host is

$$\begin{aligned} l_i^h \;=\; & \prod_{j=1}^{k_i^h} \Bigg\{ \Big[\big(1-p(z_i)\big)\lambda_0(t_{ij}) e^{\beta' X_i(t_{ij})} \exp\Big(-\int_0^{t_{ij}} \lambda_0(s) e^{\beta' X_i(s)}\, ds\Big) \Big]^{(1-\delta_{ij})(1-a_{ij})} \\ & \quad \times \Big[\big(1-p(z_i)\big)\Big(1-\exp\Big(-\int_0^{t_{ij}} \lambda_0(s) e^{\beta' X_i(s)}\, ds\Big)\Big) \Big]^{(1-\delta_{ij})a_{ij}} \\ & \quad \times \Big[\big(1-p(z_i)\big)\exp\Big(-\int_0^{t_{ij}} \lambda_0(s) e^{\beta' X_i(s)}\, ds\Big) + p(z_i) \Big]^{\delta_{ij}} \Bigg\} \\ & \times \Big[\big(1-p(z_i)\big)\exp\Big(-\int_0^{t_{i,98}} \lambda_0(s) e^{\beta' X_i(s)}\, ds\Big) + p(z_i) \Big]^{-\delta_{i,98}} \\ & \times \Big[\big(1-p(z_i)\big)\exp\Big(-\int_0^{t_{i,e}} \lambda_0(s) e^{\beta' X_i(s)}\, ds\Big) + p(z_i) \Big]^{-\delta_{i,e}} \end{aligned} \tag{A.3}$$

It is important to note that the left–truncation issues are absent in the return from abroad. For a migrant that has been administratively removed the exact date (s)he left the country is unknown. This implies that the duration of stay abroad we observe is at least from the administrative removal day till re-entry to the country (or the end of the observation period). Thus administrative removal only induces extra right-censoring. Then the likelihood contribution of migrant i to the likelihood of returning to the host is

$$\begin{aligned} l_i^a \;=\; & \prod_{j=1}^{k_i^a} \Big[\big(1-p(z_i)\big)\lambda_0(t_{ij}) e^{\beta' X_i(t_{ij})} \exp\Big(-\int_0^{t_{ij}} \lambda_0(s) e^{\beta' X_i(s)}\, ds\Big) \Big]^{(1-\delta_{ij})(1-a_{ij})} \\ & \quad \times \Big[\big(1-p(z_i)\big)\exp\Big(-\int_0^{t_{ij}} \lambda_0(s) e^{\beta' X_i(s)}\, ds\Big) + p(z_i) \Big]^{\delta_{ij}+(1-\delta_{ij})a_{ij}} \end{aligned} \tag{A.4}$$

The maximum likelihood estimates can be obtained by standard procedures.

Abbring (2002) shows that if none of the movers defect, i.e. $\lim_{t\to\infty} \int_0^t \lambda_0(s)\, ds = \infty$, then the proportion of stayers and all the parameters of the mover-intensity are identified even if both the stayer probability and the mover–intensity depend on the same set of covariates.

B Tables and Figures

Table 1: Basic statistics immigrants

	Labour	fam. reunification	fam. formation	Study
average age	32	30	29	21
female	30.6%	71.2%	69.0%	46.6%
married	12.4%	42.5%	41.7%	2.1%
		Country of origin		
Europe				
Belgium	5.3%	1.4%	0.7%	1.5%
Germany	11.3%	3.8%	2.1%	8.6%
UK	18.0%	3.8%	1.2%	1.5%
France	5.6%	1.2%	0.7%	2.6%
EU15/EFTA	22.2%	5.1%	2.6%	12.9%
Former Yugo.	0.6%	3.8%	2.5%	1.3%
new EU	3.7%	2.9%	5.3%	5.3%
rest of Europe	4.1%	4.8%	5.9%	6.3%
Asia				
Turkey	1.8%	12.9%	17.6%	1.4%
China	1.2%	2.0%	2.0%	11.6%
Iraq	$< 0.1\%$	7.3%	0.5%	$< 0.1\%$
Iran	0.3%	2.1%	0.8%	0.7%
Afghanistan	$< 0.1\%$	3.5%	0.4%	$< 0.1\%$
rest of Asia	8.9%	11.2%	14.0%	19.1%
Africa				
Morocco	1.0%	11.9%	16.4%	3.7%
rest of Africa	5.1%	10.4%	10.0%	11.1%
America				
USA/Can	7.1%	3.4%	3.6%	4.2%
Surinam	0.3%	3.4%	6.1%	2.4%
Latin America	2.0%	4.5%	6.8%	5.3%
Australasia				
Australasia	1.6%	0.8%	0.9%	0.6%
# observations	104917	36702	116100	40677

Source: Statistics Netherlands, based on own calculations.

Table 2: Basic duration statistics immigrants

	Labour	fam. reunification	fam. formation	Study
% > 5 years in NL	20%	45%	39%	16%
duration of stay (mos)	35	58	45	29
return migration	44%	20%	13%	45%
		Abroad		
duration of stay (mos)	29	32	27	31
re-immigration[a]	6%	9%	14%	6%
		Repeated migration		
2nd return migration[b]	33%	26%	19%	33%

Source: Statistics Netherlands, based on own calculations.
[a] Percentage of those that have left the country.
[b] Percentage of those that have left the country and have returned.

Table 3: Parameter estimates of the baseline intensity **intensity to leave**.

	model 1	model 2	model 3			
			labor	family reunion	family formation	study
$\alpha_1\ (0-6)$ mos.	2.395^{**}	1.215^{**}	1.141^{**}	1.977^{**}	2.011^{**}	1.010^{**}
	(0.039)	(0.049)	(0.071)	(0.136)	(0.086)	(0.174)
$\alpha_2\ (6-12)$ mos.	2.016^{**}	0.658^{**}	0.570^{**}	1.339^{**}	1.275^{**}	0.552^{**}
	(0.036)	(0.046)	(0.066)	(0.118)	(0.082)	(0.171)
$\alpha_3\ (12-18)$ mos.	1.251^{**}	-0.066	-0.307^{**}	0.661^{**}	0.538^{**}	0.130
	(0.039)	(0.048)	(0.068)	(0.121)	(0.086)	(0.170)
$\alpha_4\ (18-24)$ mos.	1.220^{**}	-0.004	-0.188^{**}	0.693^{**}	0.400^{**}	0.249
	(0.039)	(0.047)	(0.067)	(0.116)	(0.087)	(0.167)
$\alpha_5\ (24-30)$ mos.	0.964^{**}	-0.130^{**}	-0.213^{**}	0.643^{**}	0.282^{**}	-0.214
	(0.042)	(0.048)	(0.068)	(0.114)	(0.088)	(0.169)
$\alpha_6\ (30-36)$ mos.	0.860^{**}	-0.159^{**}	-0.183^{**}	0.366^{**}	0.024	-0.095
	(0.044)	(0.048)	(0.068)	(0.119)	(0.093)	(0.168)
$\alpha_7\ (36-42)$ mos.	0.565^{**}	-0.280^{**}	-0.220^{**}	0.171	$-0.276*$	-0.353^{*}
	(0.048)	(0.053)	(0.074)	(0.134)	(0.114)	(0.179)
$\alpha_8\ (42-48)$ mos.	0.476^{**}	-0.248^{**}	-0.208^{**}	0.216	-0.172	-0.329
	(0.051)	(0.056)	(0.077)	(0.137)	(0.116)	(0.185)
$\alpha_9\ (48-54)$ mos.	0.430^{**}	-0.130^{*}	-0.026	0.122	-0.097	-0.281
	(0.054)	(0.058)	(0.079)	(0.147)	(0.120)	(0.193)
$\alpha_{10}\ (54-60)$ mos.	0.204^{**}	-0.191^{**}	-0.190^{*}	0.119	-0.095	-0.124
	(0.061)	(0.064)	(0.091)	(0.154)	(0.128)	(0.199)
fam. reunion	-0.448^{**}	0.097^{*}	-	-1.310^{**}	-	-
	(0.029)	(0.038)		(0.180)		
fam. formation	-0.848^{**}	0.161^{**}	-	-	-0.641^{**}	-
	(0.023)	(0.033)			(0.127)	
study	0.317^{**}	0.198^{**}	-	-	-	0.354^{*}
	(0.020)	(0.030)				(0.177)
intercept	-5.131^{**}	-2.871^{**}	-2.761^{**}	-	-	-
	(0.037)	(0.054)	(0.071)			

Source: Statistics Netherlands, based on own calculations. *Notes:* Standard errors are shown in parentheses. $^{*}p < 0.05;^{**}p < 0.01$.

Table 3: (continued) Covariate effects on the intensity to leave

	model 1	model 2	model 3			
				(compared to base)		
			base	family reunion	family formation	study
female	-0.223^{**}	-0.369^{**}	-0.224^{**}	0.364^{**}	-0.134^{*}	-0.030
	(0.015)	(0.025)	(0.037)	(0.116)	(0.053)	(0.057)
married	-0.160^{**}	-0.289^{**}	-0.510^{**}	0.265^{**}	0.486^{**}	-0.027
	(0.021)	(0.027)	(0.042)	(0.092)	(0.056)	(0.145)
age[a]	0.099^{**}	-0.155^{**}	-0.078^{**}	0.049	0.147^{**}	0.166^{**}
	(0.012)	(0.018)	(0.020)	(0.089)	(0.042)	(0.063)
age-squared[a]	-0.021^{**}	0.042^{**}	0.025^{*}	-0.002	-0.028	$-0.085*$
	(0.007)	(0.010)	(0.013)	(0.038)	(0.022)	(0.039)
Repeated Migration						
repeat migration[b]	-0.330^{**}	-1.169^{**}	-1.109^{**}	-	-	-
	(0.103)	(0.138)	(0.142)			
t_{-1}[c]	-0.287^{*}	-0.198	-0.213	-	-	-
	(0.112)	(0.155)	(0.160)			
t_{-1}^2	0.040	0.089^{**}	0.090^{**}	-	-	-
	(0.022)	(0.031)	(0.032)			
			(selected) country of origin			
Germany	-0.194^{**}	-0.279^{**}	-0.159^{**}	-0.187	-0.179	-0.400^{**}
	(0.029)	(0.050)	(0.060)	(0.183)	(0.176)	(0.103)
UK	-0.009	0.259^{**}	0.306^{**}	-0.195	-0.071	-0.173
	(0.027)	(0.040)	(0.045)	(0.148)	(0.130)	(0.119)
new EU members	-0.289^{**}	0.110^{*}	0.444^{**}	-1.494^{**}	-1.822^{**}	-0.673^{**}
	(0.038)	(0.056)	(0.072)	(0.252)	(0.171)	(0.123)
rest of Europe	-0.709^{**}	-0.072	-0.256^{**}	-0.992^{**}	0.597^{**}	-0.005
	(0.040)	(0.062)	(0.092)	(0.244)	(0.130)	(0.143)
Turkey	-1.123^{**}	0.368^{**}	0.157	-1.799^{**}	0.789^{**}	-0.470^{*}
	(0.046)	(0.057)	(0.110)	(0.219)	(0.137)	(0.229)
China	-0.837^{**}	0.024	0.062	-1.335^{**}	0.390	-0.746^{*}
	(0.050)	(0.082)	(0.118)	(0.428)	(0.202)	(0.328)
rest of Asia	-0.146^{**}	-0.257^{**}	-0.333^{**}	-0.424^{**}	-1.175^{**}	-0.396^{**}
	(0.026)	(0.041)	(0.053)	(0.154)	(0.106)	(0.113)
Morocco	-1.186^{**}	0.811^{**}	0.509^{**}	-2.753^{**}	0.681^{**}	0.176
	(0.047)	(0.052)	(0.109)	(0.211)	(0.123)	(0.128)
rest of Africa	-0.378^{**}	0.084	0.269^{**}	0.290	0.400^{**}	-0.650^{**}
	(0.031)	(0.046)	(0.069)	(0.152)	(0.099)	(0.096)
USA/Can	0.305^{**}	0.020	0.042	0.187	-0.323^{*}	0.313^{**}
	(0.029)	(0.048)	(0.056)	(0.140)	(0.130)	(0.105)
Log-likelihood	-85831.358	-83410.756	-83081.194			

[a] Centered at the average age of 25 years and divided by 10.
[b] Indicator of repetitive entry.
[c] years spent in The Netherlands during previous stay.
Source: Statistics Netherlands, based on own calculations. *Notes:* Standard errors are shown in parentheses. $^{*}p < 0.05$;$^{**}p < 0.01$. Base migration motive is labor

Table 3: (continued)
Parameter estimates for probability to **stay in the Netherlands**

	model 2	model 3
female	0.382**	0.379**
	(0.024)	(0.025)
married	0.251**	0.187**
	(0.029)	(0.033)
age[a]	−0.133**	−0.142**
	(0.017)	(0.018)
age-squared[a]	0.027*	0.036**
	(0.011)	(0.011)
fam. reunion	0.579**	0.282**
	(0.040)	(0.064)
fam. formation	1.055**	0.682**
	(0.032)	(0.043)
study	−0.449**	−0.405**
	(0.033)	(0.043)
	(selected) country of origin	
Germany	0.242**	0.276**
	(0.048)	(0.046)
UK	−0.059	−0.084
	(0.045)	(0.046)
new EU members	0.457**	0.231**
	(0.056)	(0.077)
rest of Europe	0.957**	0.921**
	(0.055)	(0.060)
Turkey	1.152**	1.068**
	(0.066)	(0.075)
China	1.236**	1.168**
	(0.069)	(0.116)
rest of Asia	0.226**	−0.121
	(0.040)	(0.073)
Morocco	0.802**	0.529**
	(0.076)	(0.088)
rest of Africa	0.509**	0.481**
	(0.047)	(0.051)
USA/Can	−0.583**	−0.533**
	(0.052)	(0.054)
Constant	−1.124**	−1.086**
	(0.031)	(0.032)

[a] Centered at the average age of 25 years and divided by 10. *Source:* Statistics Netherlands, based on own calculations. *Notes:* Standard errors are shown in parentheses. $^{*}p < 0.05;^{**}p < 0.01$.

Table 4: Parameter estimates of intensity to **return to The Netherlands**

	model 1	model 2	model 3			
			labor	family reunion	family formation	study
α_1 $(0-6)$ mos.	1.069^{**}	0.913^{**}	0.813^{**}	1.035^{**}	1.086^{**}	0.636^{**}
	(0.033)	(0.041)	(0.054)	(0.119)	(0.070)	(0.130)
α_2 $(6-12)$ mos.	0.839^{**}	0.719^{**}	0.683^{**}	0.879^{**}	0.868^{**}	0.374^{**}
	(0.036)	(0.041)	(0.057)	(0.120)	(0.072)	(0.124)
α_3 $(12-18)$ mos.	0.581^{**}	0.487^{**}	0.516^{**}	0.579^{**}	0.543^{**}	0.190
	(0.041)	(0.043)	(0.061)	(0.131)	(0.080)	(0.126)
α_4 $(18-24)$ mos.	0.440^{**}	0.371^{**}	0.388^{**}	0.362^{*}	0.405^{**}	0.224
	(0.045)	(0.047)	(0.068)	(0.146)	(0.087)	(0.125)
intercept	-5.817^{**}	-5.106^{**}	-5.192^{**}	-	-	-
	(0.048)	(0.195)	(0.211)			
fam. reunion	0.264^{**}	1.039^{**}	-	1.480^{**}	-	-
	(0.046)	(0.146)		(0.266)		
fam. formation	0.522^{**}	0.836^{**}	-	-	0.386^{*}	-
	(0.036)	(0.087)			(0.160)	
study	-0.325^{**}	1.455^{**}	-	-	-	2.123^{**}
	(0.038)	(0.152)				(0.251)
			base	family reunion	family formation (compared to base)	study
female	0.011	-0.092	-0.011	-0.851^{**}	-0.181^{*}	-0.633^{**}
	(0.027)	(0.056)	(0.076)	(0.153)	(0.081)	(0.176)
married	0.414^{**}	0.113	0.253^{**}	-	-	-
	(0.032)	(0.095)	(0.084)			
age[a]	-0.283^{**}	-0.258^{**}	-0.254^{**}	-	-	-
	(0.019)	(0.034)	(0.027)			
age-squared[a]	0.071^{**}	0.076^{**}	0.067^{**}	-	-	-
	(0.012)	(0.023)	(0.017)			
Repeated Migration						
repeat migration[b]	0.162^{*}	0.310^{**}	0.295^{**}	-	-	-
	(0.069)	(0.077)	(0.074)			
t_{-1}[c]	-0.751^{**}	-0.804^{**}	-0.797^{**}	-	-	-
	(0.027)	(0.028)	(0.028)			
t_{-1}^2	0.079^{**}	0.085^{**}	0.083^{**}	-	-	-
	(0.005)	(0.005)	(0.005)			
Log-likelihood	-45287.21	-45145.03	-45055.75			

[a] Centered at the average age of 25 years and divided by 10.
[b] Indicator of repetitive entry.
[c] years spent in The Netherlands during previous stay.
Source: Statistics Netherlands, based on own calculations. *Notes:* Standard errors are shown in parentheses. $^{*}p < 0.05$;$^{**}p < 0.01$. Base country of origin is EU/EFTA. Base migration motive is labor.

Table 4: (continued) Covariate effects on the intensity to return to the Netherlands

	model 1	model 2	model 3 (compared to base)			
			base	family reunion	family formation	study
			(selected) country of origin			
Germany	0.125^{*}	-0.213^{*}	-0.128	-	-	-
	(0.052)	(0.108)	(0.094)			
UK	-0.023	-0.106	-0.252	-0.814^{**}	-0.445^{*}	-0.775
	(0.051)	(0.115)	(0.134)	(0.271)	(0.208)	(0.540)
new EU members	0.436^{**}	0.136	0.029	0.083	0.566^{**}	0.012
	(0.057)	(0.111)	(0.118)	(0.270)	(0.124)	(0.258)
rest of Europe	0.475^{**}	0.036	0.205	-	-	-
	(0.061)	(0.121)	(0.106)			
Turkey	0.112	-0.471^{**}	-0.173	-	-	-
	(0.070)	(0.145)	(0.132)			
China	0.275^{**}	-0.235	-0.256	-0.147	0.571^{*}	0.553
	(0.092)	(0.186)	(0.223)	(0.401)	(0.275)	(0.343)
rest of Asia	0.051	-0.474^{**}	-0.556^{**}	0.067	0.635^{**}	0.563^{**}
	(0.047)	(0.121)	(0.115)	(0.154)	(0.105)	(0.178)
Morocco	0.321^{**}	-0.232	0.007	-	-	-
	(0.066)	(0.130)	(0.122)			
rest of Africa	0.204^{**}	-0.121	-0.019	-	-	-
	(0.053)	(0.109)	(0.090)			
USA/Can	-0.470^{**}	-0.812^{**}	-0.676^{**}	-	-	-
	(0.064)	(0.130)	(0.111)			

Source: Statistics Netherlands, based on own calculations. *Notes:* Standard errors are shown in parentheses. $^{*}p < 0.05;^{**} p < 0.01$. Base country of origin is EU/EFTA. Base migration motive is labor

Table 4: (continued)
Parameter estimates for probability to **stay abroad**

	model 2	model 3
female	−0.208	−0.689**
	(0.110)	(0.172)
married	−1.281**	−1.038**
	(0.264)	(0.186)
age[a]	0.162*	0.205**
	(0.073)	(0.062)
age-squared[a]	−0.017	−0.049
	(0.059)	(0.048)
fam. reunion	2.025**	2.205**
	(0.445)	(0.605)
fam. formation	0.787*	−0.464
	(0.340)	(0.999)
study	3.091**	3.456**
	(0.487)	(0.629)
	(selected) country of origin	
Germany	−0.811**	−0.689**
	(0.182)	(0.165)
UK	−0.028	−1.218
	(0.271)	(0.631)
new EU members	−0.749**	−0.606*
	(0.184)	(0.248)
rest of Europe	−1.128**	−0.931**
	(0.210)	(0.184)
Turkey	−1.671**	−1.002**
	(0.338)	(0.292)
China	−1.041**	−0.566*
	(0.278)	(0.287)
rest of Asia	−1.236**	−0.791**
	(0.177)	(0.175)
Morocco	−1.513**	−1.291**
	(0.275)	(0.211)
rest of Africa	−0.753**	−0.646**
	(0.173)	(0.153)
USA/Can	−0.757**	−0.537*
	(0.259)	(0.238)
Constant	−0.649	−0.733
	(0.518)	(0.614)

[a] Centered at the average age of 25 years and divided by 10. *Source:*Statistics Netherlands, based on own calculations. *Notes:* Standard errors are shown in parentheses. * $p < 0.05$;** $p < 0.01$.

Table 5: Implied stayer probabilities

	labor	family reunion	family formation	study
In the Netherlands				
reference migrant[1]	24%	68%	73%	19%
male		60%	65%	
female	32%			26%
married	28%		77%	23%
single		64%		
		(selected) Country of origin		
EU15[2]		43%	48%	
Germany	30%	49%	55%	24%
UK	23%	41%	46%	18%
new EU members	29%	48%	54%	23%
rest of Europe	44%	65%	70%	38%
Turkey	48%			41%
China	51%	70%	75%	44%
rest of Asia	22%	40%	45%	18%
Morocco	35%	56%	61%	29%
rest of Africa	34%	55%	60%	28%
USA/Canada	16%	30%	35%	12%
Abroad				
reference migrant[1]	34%	24%	6%	93%
male		38%	11%	
female	21%			87%
married	16%		2%	83%
single		47%		
Country of origin				
EU15[2]		46%	14%	
Germany	21%	30%	8%	87%
UK	13%	20%	5 %	80%
new EU members	22%	32%	8%	88%
rest of Europe	17%	25%	6%	84%
Turkey	16%			84%
China	23%	32%	8%	89%
rest of Asia	19%	28%	7%	86%
Morocco	13%	19%	4 %	79%
rest of Africa	22%	31%	8%	88%
USA/Canada	23%	33%	9%	89%

Source: Statistics Netherlands, based on own calculations.

[1] Labor: male from EU15 or EFTA (excl. Belgium, Germany, UK and France) unmarried 30 years, Family reunion: female married from Turkey 30 years, Family formation: female unmarried from Turkey 29 years, Study: male EU15 or EFTA (excl. Belgium, Germany, UK and France) unmarried 21 years.

[2] EU15 or EFTA (excl. Belgium, Germany, UK and France).

Table 6: Long-run probability to reside in The Netherlands

	labor	family reunion	family formation	study
reference migrant[1]	48%	90%	98%	21%
male		80%	95%	
female	69%			29%
married	71%		99%	26%
single		79%		
Country of origin				
EU15[2]		62%	87%	
Germany	67%	77%	94%	27%
UK	69%	77%	95%	22%
new EU members	64%	75%	94%	26%
rest of Europe	82%	88%	97%	42%
Turkey	85%			46%
China	82%	88%	97%	47%
rest of Asia	60%	70%	92%	20%
Morocco	81%	87%	97%	34%
rest of Africa	71%	80%	95%	31%
USA/Canada	44%	57%	86%	14%

Source: Statistics Netherlands, based on own calculations.

[1] Labor: male from EU15 or EFTA (excl. Belgium, Germany, UK and France) unmarried 30 years, Family reunion: female married from Turkey 30 years, Family formation: female unmarried from Turkey 29 years, Study: male EU15 or EFTA (excl. Belgium, Germany, UK and France) unmarried 21 years.

[2] EU15 or EFTA (excl. Belgium, Germany, UK and France).

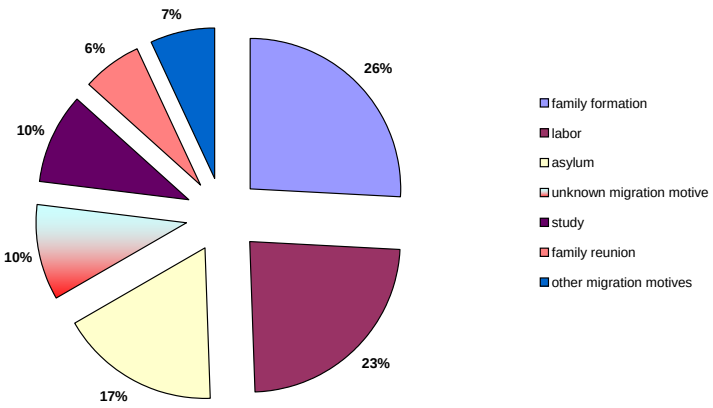

Figure 1: Non-Dutch immigrants (18-64) by migration motive, 1995-2003

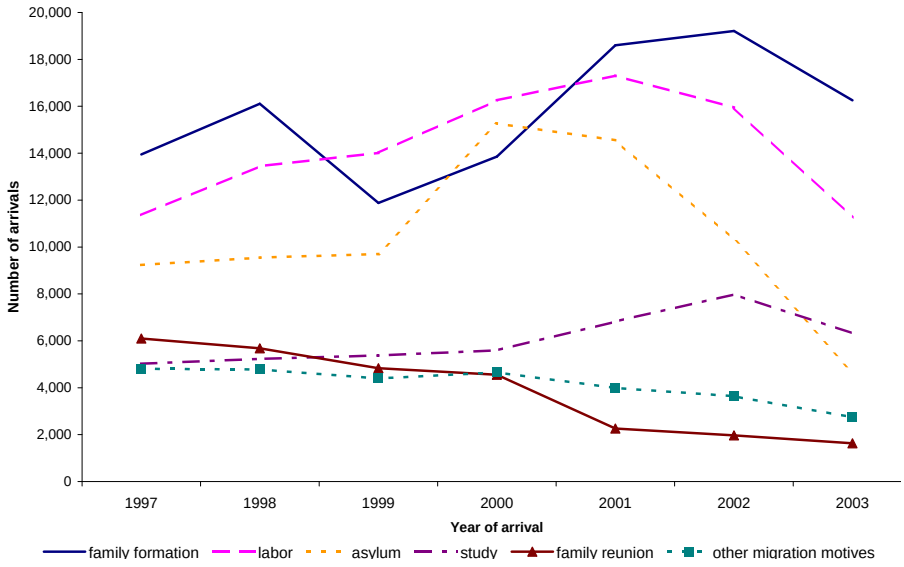

Figure 2: Development of Non-Dutch immigrants (18-64) by migration motive, 1995-2003

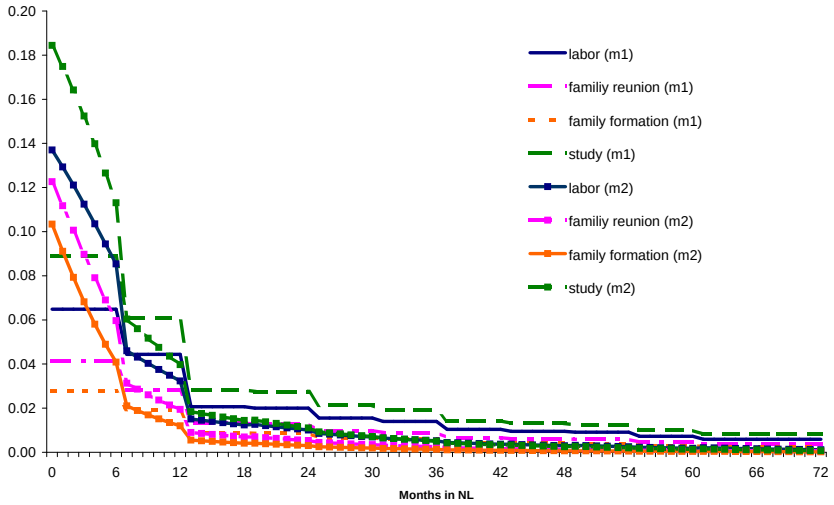

Figure 3: Baseline intensity to leave The Netherlands (unconditional)
m1: Model1; m2: unconditional baseline intensity to leave model 2

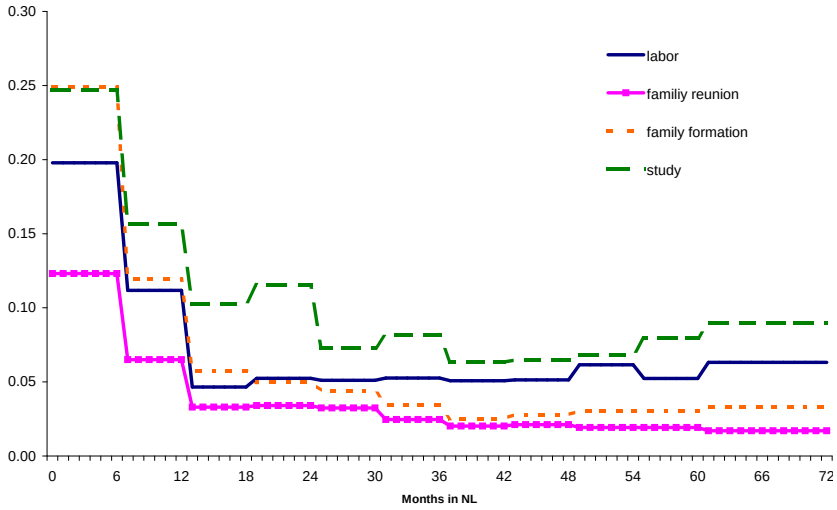

Figure 4: Baseline intensity to leave The Netherlands, movers

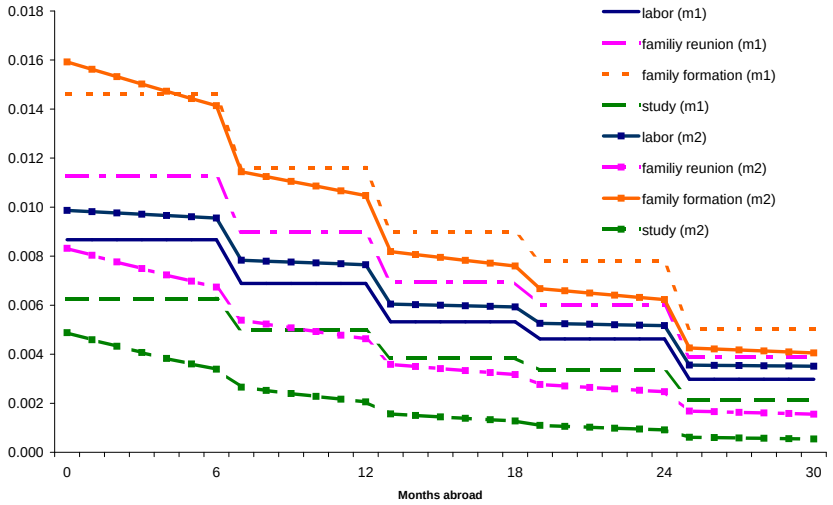

Figure 5: Baseline intensity to return form abroad to The Netherlands (unconditional) m1: Model1; m2: unconditional baseline intensity to return model 2

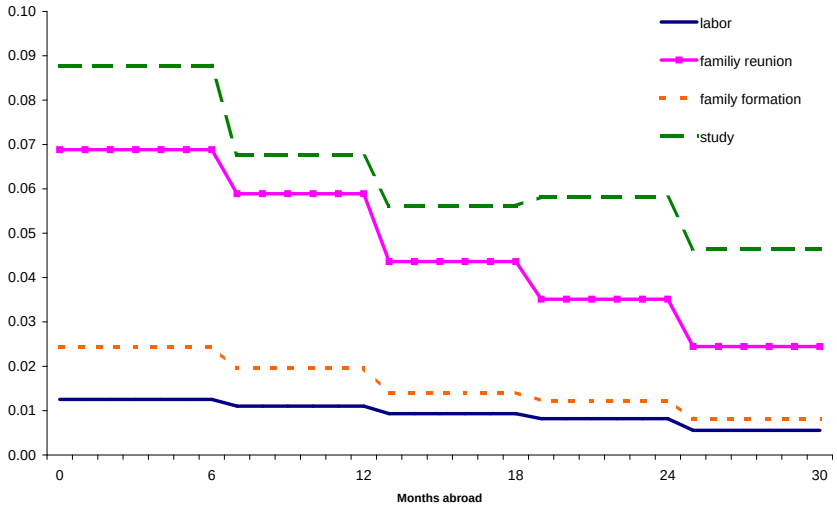

Figure 6: Baseline intensity to return form abroad to The Netherlands, movers

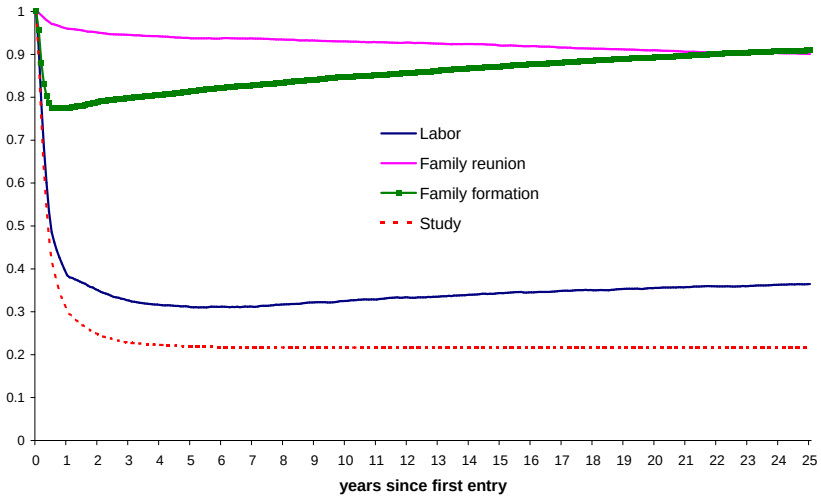

Figure 7: Simulated migration dynamics for a cohort of a typical immigrant.
Labor: male EU/EFTA unmarried 30 years, Family reunion: female married Turkey 30 years, Family formation: female unmarried Turkey 29 years, Study: male EU/EFTA unmarried 21 years