The Dynamics of Immigration;

an Analysis Using Micro Data Immigration Multipliers

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Abstract: In this paper we present an immigration multiplier based on a comprehensive full population register data set for an extended period, 1980-2009. We use information on the individuals' residential addresses and on the immigrants' arrival/departure dates to identify original immigrants and derived immigrations (family and network reunification). This allows us to study the dynamics of immigration and to associate the magnitude of derived immigration with the individual characteristics of the original immigrants. The main results are that one original immigrant becomes 2.6 immigrants on average via reunification with family and others. This number varies greatly by country of origin, by age, and by education; varying the country of origin alone makes the multiplier varies between 1.5 and 5.5. Based on recent Danish experiences we finally show that the reproduction of immigrations reacts strongly to changes in immigration laws.

Keywords: Family reunification, network, immigrants' skills, immigration laws, forecasting immigration.

JEL-codes: F22, J11, J15, J24, K37

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1. Introduction

In this paper we study the dynamics of immigration. When a country gives residence permission to a foreigner it often initiates a process of further immigration. There are a number of reasons why an originally arriving immigrant, who wants to stay in the country, would initiate further immigration. The most obvious is that the new immigrant wants his or her family to come as well, but it could also be friends and associates that are attract by the information received or the possible opportunities facilitated by this new contact in the country. According to the typical Aliens Acts of developed countries, foreigners are allowed to bring their families to the country, and typically, it is also possible for foreigners to take up certain jobs or enrol in education; arrangements that might be based on contacts that the original immigrant has established. Hence, one original immigrant is expected to trigger a certain amount of *derived* immigration.

The derived immigrants typically acquire the same rights as the original immigrants and therefore the possibility arises of a "chain of immigration". Chains of this kind are furthered as well as limited by a number of factors, and whether the process imply an accelerating or a decelerating immigration depends on the given country's immigration laws, the characteristics of the immigrants, the traditions in both sending and receiving countries, etc. Precise knowledge of the dynamics of the immigration process is important to know independently on whether the government wants to control the process or simply wants to be prepared for the integration effort that is, or might be, needed down the road.

In this paper we present an immigration multiplier based on micro date that can be used to monitor and characterize the dynamics of immigration in a given country. First of all the multiplier associates the derived immigration to any given original immigrant, in principle with as many link in the chain as the studied time horizon allows. Thus, the over all process can be described and followed. Secondly, the micro data foundation of the multiplier makes it possible to characterize - by demographics and country of origin - what types of immigrants that generate the most derived immigration. Finally, the multiplier we present allows us to study how the magnitude and dynamics of immigration react to changes in immigration laws. These topics will be discussed in this paper using Danish full population micro panel data from 1980 to 2009.

Dividing the immigrant population into original and derived immigrants also allows us to discuss what characterizes the two groups in terms of age, gender, and skill level.

According to the literature in economics, the decision to migrate is in most cases attributable to individuals attempting to maximise their lifetime welfare or lifetime income. In practice, however, it is often entire families who have to take the decision together (Mincer 1978). Economic benefits are most often listed among the advantages of migration. These may be in the form of the availability of better paid work, or of a welfare system that is more developed in the new country. One way of minimising the costs of moving a family from one country to another is for the family members to migrate in succession (Borjas and Bronars 1991). Thus, perhaps one member of the family will leave first, typically the one who stands to gain most by migrating (e.g., the better skilled, more experienced). This person may then settle in the new country and send money home, or return home again, or attempt to bring the rest of the family to the new country. In the latter case, the costs of migrating and getting established in a new country will be less for the next members of the family, as a result of the experience and the networks built up by the first moving family member in the new country (Carrington et al. 1996).

Borjas and Bronars (1991) emphasize the role of chain-migration and the importance of the order in which family members arrive to the new country. They agree with Mincer and stresses also that the first link in the migration chain is more likely to be the person who has the most to gain individually from immigration. With the multiplier we present here it is possible to study the dynamics of immigration both quantitatively and qualitatively: how important is the chain-migration element. Firstly, how important is the derived immigration compared to the original, that is, how big is the multiplier, and secondly, how strong is the contribution to the multiplier of future rounds of derived immigration compared to the first round of derived immigration? A qualitative aspect to be studied could for instance bet to look at whether the time profile of the multiplier varies with the characteristics of the original immigrant?

Jasso and Rosenzweig (1989) used retrospective data to describe the original immigrants and those arriving for family reunification. The data were retrospective in the sense that immigrants to the USA in 1985 were asked about their relationship to previous immigrants. In contrast, in this study it has been possible to work forwards in time. In other words, taking all original

immigrants in the period 1981-1990, for example, as the starting point, it is possible to trace subsequent family and other reunifications up until 2008.

The next section presents our hypothesis based on the literature on immigration. Section 3 discusses the methodology and the most important prerequisites for calculating the immigration multiplier. Section 4 presents the data. Section 5 describes the recent history of original immigration and reunification immigration to Denmark, and presents the immigration multipliers and the main analytical results. Section 6 discusses the effect of the recent changes in immigration laws in Denmark to the immigration multiplier, while section 7 sums up and concludes.

2. Hypotheses

The literature on immigration offers a number of hypotheses concerning emigration as such but little in the way of understanding the dynamics of the immigration process. Predictions about who tend to emigrate, from what type of countries, and to where, can be based on the extensive migration literature in the social sciences. Sjaastad (1962) follows the approach of Becker's (1962) human capital theory and characterizes the emigrants as the citizens who stand to gain the most by emigration and they move to the destination countries where the expected return is the highest among the accessible countries. See also Zimmermann and Bauer (2002) for discussions on this and more references.

In contrast to this are questions like the following more scarcely discussed: Is it more likely that families emigrate than singles? If families move, who move first then? What types of original immigrants –age, gender, skills, etc. - initiate the biggest subsequent immigration? And is the timing of the derived immigration different for different types of original immigrants? To the best of our knowledge, the last question is not discussed in the literature at all. The other questions, however, are touch upon by authors directly or indirectly. Concerning the family angle, Mincer (1987) takes as his primitive the expected gain to the family but stresses also the importance of the individual gains by emigration. He conjectures that in general, it will be the gain of the spouse – the tied mover – that is the smallest. And this spouse will typically be the women due to her lower earnings on average. Following these lines of thoughts, families may be

less likely to migrate than singles, because of such ties. And furthermore, since gain from migration is often related to job-mobility, families with two wage-earners will be less likely to migrate than single-earner families. Finally, people from poor countries are in general expected to move more frequently to rich countries than the other way around.

Summarizing this gives rise to the following hypothesis:

Hypothesis 1: The initial immigrant from a poor country is more likely of bringing family and friends than an initial immigrant from a rich country. Thus the multiplier is bigger for non-Western immigrant than for Western immigrants.

Hypothesis 2: The initial immigrant tent to be a young adult male, and thus the derived immigration is more likely to consist of females and younger or older individuals. Therefore the multiplier is biggest for middle age men with low education.

Both these hypothesis identify immigrant groups for whom the chain element in migration is relatively strong because the derived immigration is relatively big. We do not have any ground on which to found hypothesis about the absolute magnitude of the multiplier or about the timing of the contribution to the multiplier over the different rounds of derived immigration. We will discuss this, nevertheless, in order to clarify whether the chain element in migration makes the immigration process an accelerating or decelerating process, and in order to identify which round of migration are the most important for the overall magnitude of the multiplier.

Finally, we will also look at how the immigration multiplier reacts to changes in migration laws with the Danish case as an illustration. Denmark changed its immigration regime around 2000 by changing the general rules of admission to the country. However, the conditions in Denmark affect different types of immigrants quite differently and the circumstances in the immigrants home countries are also quite different, and therefore, we would expect the new immigration laws to affect the immigrant groups differently as well; the more important reunification immigration used to be for a given group, the bigger an effect on the groups' multiplier we expect to find:

Hypothesis 3: The multipliers for the different immigration groups react to changes in immigration laws according to how important reunification is for each of these groups.

In section 5 we will test these hypothesizes; mainly the first three. The last hypothesis will only be discussed more tentatively, because we do not have comprehensive information on whether immigrants are refugee or not. We only have information on year of immigration and country of origin, which only to some extent indicate whether an immigrant is a refugee or not.

3. Methodology

In this section we introduce the computational procedure behind the multiplier and define the key variables that constitute it.

3.1 Definitions of the Key Variables

An *original immigrant* is defined as an immigrant who either moves into his or her own home or moves in with a native family at the time of immigration. Thus, immigrants who take up residence with native persons are in this study considered the first immigrant in a possible chain and are accordingly classified as original immigrants even though they will often have residence permits granted on the grounds of family reunification.

The *derived immigration* consists of family reunification immigrants, network immigrants, and second generation immigrants. In principle one could continue and include further generation but in this analysis we have decided to stop with the children of immigrant. The precise definition of the three types of derived immigrants follows:

Family reunification immigrants are defined as close family members to an original immigrant who at the year of immigration moves into the home of the original immigrant. Close family members are defined as children, parents or spouses.

Network reunification immigrants are defined as immigrants who are not family reunifications immigrants but move to Denmark and establish residence at an address where another immigrant lives.

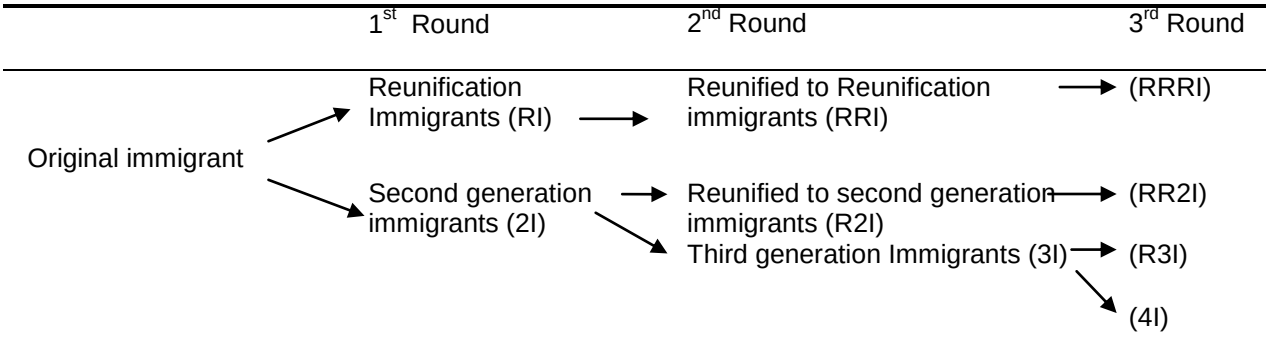
Second generation immigrants are defined as people who were born in Denmark, and at least one of whose parents was an immigrant.

3.2 The Multiplier

From the few variables defined above we can compute the immigration multiplier. The procedure is to first identify all original and derived immigrants in the data and then for each original individual immigrant assign all derived immigrants over the time horizon available. This enables us to compute the individual multiplier for each original immigrant and afterwards aggregate over all original immigrants or subgroups of these.

The multipliers computed in this paper are based on only two rounds of immigration as just mentioned and we are also considering only up to second generation immigrants. That could in principle cover any number of rounds and any number of generations as illustrated in Figure 1.

Fig. 1 Illustration of integration multiplier



When computing the multiplier we begin with the *individual multiplier IM*$_i$ for person *i*, which is simply adding up the different contributions to the original immigrants and add one, the original immigrant him- or herself:

(1) $$IM_i = 1 + RI_i + 2I_i + RRI_i + R2I_i + ...$$

Where RI_i is the number of derived immigrants to person *I*, $2I_i$ is the number of children of person *I*, RRI_i is the number of derived immigrants to derived immigrants to person *I*, $R2I_i$ is the number of derived immigrants to children of person *I*, etc.

The *first round multiplier* is then:

$$IM(1) = 1 + \frac{\sum_{i=1}^{I} (RI_i + 2I_i)}{I}, \tag{2}$$

where I is the number of original immigrants. Multipliers for the following round can be computed separately as well. The *total multiplier* is simply

$$IM = \frac{\sum_{i=1}^{I} IM_i}{I}. \tag{3}$$

With the data that we have at our disposal, the Danish micro data, there is no point in including more than 2 rounds. We will also disregard the 3. generation immigrants - the children of the children of the original immigrants - because they are still very few in the Danish population.

In the first round, a simple summation of the numbers of immigrants who move into the homes of original immigrants[1] produces a total number of reunification immigrants. In order to obtain the multiplier, this total – including the number of original immigrants – is related to the number of original immigrants. If an original immigrant is accompanied by children at the time of immigration, these children are counted as family reunification immigrants, whereas children born in Denmark (second generation immigrants) are not. Second generation immigrants are included in the calculations by the computation of a second round multiplier. In the second round, it is the reunification and the second generation immigrants from the first round who are the "original immigrants" who may generate new reunification immigrants. Reunification and second generation immigrants from the first round may also have children (second/third generation immigrants), but these are not included in the second round multiplier and thus no part of this analysis, which stops at the second round.

[1] Reunification takes place at the current address of the original immigrant. In other words, if the original immigrant moves to a new address, family reunification that takes place there will also be registered.

4. Data

The analysis below is based on data from registers held at Statistics Denmark, in particular the population and housing registers for the years 1980 to 2008 that contains information about the 5.4 million people living in Denmark. In addition, the register for changes of address of families and households has been used to find immigrants' first registered addresses in Denmark.[2] This is important, since the information can be used to link people who have a (family) network which may have been abandoned soon after their arrival in Denmark. It is possible to differentiate between family and non-family links, since the registers include information on family relationships within the household. However, we do only use the label 'reunification' if the immigrant in question does move into the address of an original immigrant upon arrival in the country. If not, the new arrival will be classified as an original immigrant. Therefore, some network reunification will not be counted as derived immigration which results in a downwards bias of the multiplier. We assume that this only happens relatively rarely. The analysis can cover a long period (in this case, immigration for the period 1981-2008) and all nationalities. It is thus possible to describe for all immigrant groups an immigration multiplier where the original immigrant is linked to subsequent immigrants.

4.1 Sample Restrictions

The formation of immigration chains is as previously mentioned assessed through the home address.[3] However, some places of domicile may have residents who did not know each other before their arrival. This might be the case for student residences, for example, or other residential institutions. Such places of residence are therefore excluded from the analysis. In addition, a number of residential addresses are listed as being the homes of large numbers of individuals, and this reduces the likelihood that these individuals knew each other previously. The analysis is therefore limited to addresses where there are 25 or fewer registered residents on the first day of the year. We also exclude the immigrations who were not first-time immigrants as well as immigrants who took up residence at addresses which received more than 25

[2] In the case of refugees, the first registration of an address is made when they obtain their residence permit and, in principle at least, move out of the refugee camp or the like where they were originally housed.

[3] The home address is described in terms of municipality, street name, building number, floor number, and which side of the stairway/hallway an apartment entrance is on.

immigrants the same year.[4] Since the regulations concerning residence in Denmark are linked to nationality, immigrants must by definition be of a nationality other than Danish. Finally, immigrants of Danish origin (for instance immigrants of foreign nationality but with one Danish parent) and second generation immigrants are not counted as immigrants in the study.[5] TABLE **1** presents a comparison between the figures in the national statistics database for numbers of foreigners immigrating to Denmark and figures based on information obtained from the registers used in the study. These registers indicate smaller numbers of people immigrating, since inclusion in the registers requires that a person should be resident in Denmark on the last day of a calendar year. This means that people staying for very short periods are not included in the figures based on the registers.[6]

Table 1 Numbers of foreigners immigrating to Denmark and in the sample

	1981	1986	1991	1996	2001	2006	2008
National statistics database	13,361	22,543	22,122	31,527	33,654	34,281	50,196
Registers	9736	19,886	19,358	27,932	29,431	28,544	43,810
Reduced*	6873	12,479	14,488	19,170	19,890	20,358	33,279

Notes: *Excluding immigrants who lived on arrival in student residence or other residential institutions, had lived in Denmark previously and those taking up residence at addresses where more than 25 immigrants per year moved in to the same place of residence.
Source: Own calculations.

The population analysed here, i.e., in our sample, is shown in the third row of the table and labelled "Reduced". The reduction in the data is brought about mainly by the exclusion of immigrants coming to Denmark for short periods, students who live in student residences, immigrants who live in residential institutions, immigrants who go to live in shared reception addresses, and immigrants who have lived in Denmark previously. As a result of the exclusions,

[4] In addition, a very small number of immigrants are excluded because they had a home in Denmark before they formally immigrated to the country. In 1981 there were three such immigrants, and in 2008 there were two.
[5] Second generation immigrants born in Denmark before 2009 are included in the analysis (see below).
[6] The removal of a proportion of the short stays skews the multiplier upward, since short stays rarely lead to many reunifications.

the final populations of immigrants analysed are reduced by between 50% and 65% of all immigrants.

5. Analysis

In this section we first describe the development over time in the different variables that influences the multiplier. We then present computations of the multiplier introduced above; both the general one and a short-run version of that. The practical details of identifying the variables are discussed in Appendix B.

5.1 Trends in the Composition of Original and Derived Immigrants

Below we first focus on the original immigrant. What is the fraction of the immigration population that we can characterized as original immigrants, who are they in terms of age, gender, education, country or origin; and how many has a home of their own as their first registered accommodation in Denmark and how many move into the home of a Dane? We then proceed with the reunified immigrants. A part form looking at their demographic characteristics we ask the questions of how many are joining close families and how many are joining others. Here we are also interested in the differences across the main sending countries with respect to these patterns. Finally, we describe the second generation immigrants. Data limitations force us to look only at second immigrants at age 28 or less.

The sending countries are divided into Western and non-Western nationalities. Western nationalities are defined as: Andorra, Iceland, Liechtenstein, Monaco, Norway, San Marino, the Vatican state, Switzerland, Australia, New Zealand, the USA and Canada, in addition to the 27 countries that are EU members (though excluding Denmark); non-Western nationalities counts as all the rest of nationalities. Overall, around two-third of all immigrants to Denmark are of non-Western origin. Attention is also given in the analysis to other geopolitical/geographical areas for three sub-periods.

Table 2 shows the proportions of original immigrants of Western and non-Western origins. The proportion of original immigrants to Denmark fell from an average of 46% in the period 1980 to

1989 to 41% in the period 2000 to 2008. In particular, there was a fall in the proportion of original immigrants among those of Western origin, whereas the proportion of original immigrants among non-Westerners remained steady at between 29% and 32%.

Some of the original non-Western immigrants will have been refugees and some will have moved in with Danes. Some of the original Western immigrants will also have moved in with Danes, while others will have arrived with the purpose of work or study. Original immigrants primarily come to the country to "live" with Danes, to work for a Danish company, to study at a Danish educational institution, or as refugees. Thus the proportion of original immigrants that includes unifications with Danes, is a reflection of the Danish demand for immigrants,[7] and Danes make up 90% of the total population. In other words 10 percent of the population accounts for 50 percent of immigration (reunification).

Table 2 Proportions of immigrants who were original immigrants, by origin and period

	1980-1989	1990-1999	2000-2008	No. Obs.
	%	%	%	N
Nordic Region	57.7	53.5	52.1	59,753
EU15 countries	61.0	58.9	51.5	83,632
EU12 countries	42.6	48.8	37.1	47,205
Other Western countries	67.6	67.1	58.3	31,853
All Western countries	**59,7**	**57,2**	**48,1**	**110,088**
Other European countries	23.1	29.8	32.8	35,189
Central and South America	60.6	66.0	59.7	11,962
Asia and Oceania	28.7	31.3	35.0	72,739
Africa	56.4	30.6	28.5	25,809
The Middle East	26.3	21.7	20.3	70,894
Unknown origin or stateless	28.2	21.3	38.1	1,174
All non-Western countries	**30.3**	**29.0**	**32.2**	**217,767**
Total	**45.6**	**41.5**	**40.9**	**440,210**

TABLE 2 also shows the proportions of original immigrants according to geopolitical/geographical areas of origin. For the Nordic area, the EU15 countries and Other

[7] The proportion of immigrants who came in response to demand may be even greater, in that among reunification immigrants there may be a proportion with work or study permits. In contrast, the number of refugees is not necessarily a reflection of demand for immigrants.

Western countries – the pattern is consistently one of decline in the proportion of original immigrants. The proportion of original immigrants also fell over time among those from the Middle East and Africa. The proportions of original immigrants for Other Western countries and for Central and South America are very high and are due to the number of immigrants who moved in with Danes.

It is surprising that so small a proportion of the immigrants from the EU12 countries are original immigrants, since there has been a great increase in employment-related immigration from these countries (EU12 is the 12 countries joining EU after 2000). However, on closer examination it can be seen that many immigrants from the EU12 countries who are classified as reunification immigrants actually have work, but live with other immigrants. This suggests that the method used for calculating the extent of reunification immigration may not be entirely appropriate in this case and might upward bias the numbers.[8]

Table 3 show the summary statistics for both original and derived immigrants. The sample contains 440,210 individuals, of whom 184,886 are classified as original immigrants and 255,423 as derived immigrants. The original immigrants are on average 29.4 years old; 53 percent are males; 35, 29, and 35 percent have respectively primary or secondary, vocational, and tertiary schooling as their highest completed schooling-level. The derived immigrants are much younger (on average 22.6 years) and much less educated, which is possibly a consequence of the former. The derived immigrants are somewhat younger than expected, but the derived immigrants are more age dispersed than the original immigrants, which is what we expected. Half the group of derived immigration, 52 percent, has no education beyond primary or secondary level. Finally, the gender ratio is surprisingly enough not that different between the two groups; only little more than half of the original immigrants are male.

[8] An examination of the family relationships among the people living at the same address might reveal whether the situation was one of "working communities" (see below).

Table 3 Descriptive Statistics

	Original immigrants			Derived immigrants		
	N	Mean	Std.	N	Mean	Std.
Age	184,886	29.4	10.0	255,324	22.6	13.6
Male	184,886	0.53	0.50	255,324	0.47	0.50
Primary and secondary school (excl. vocational)	69,724	0.35	0.48	76,660	0,52	0.50
Vocational school	69,724	0.29	0.45	76,660	0,23	0.43
Tertiary school	69,724	0.35	0.48	76,660	0,22	0.42

Table 4 shows that around 50% of the original immigrants move into their own homes. There is a trend towards a small increase over time in the propensity to do so. There appears to be no great difference between Western and non-Western immigrants in this respect, which might seem a little surprising, because immigrants from non-western countries acquire the biggest share of the family reunification permits issued among the two groups.

Table 4 Proportions of original immigrants who moved into their own homes on immigration, by origin and period

	1981-1989	1990-1999	2000-2008	No. Obs.
	%	%	%	N
Nordic Region	60.9	59.6	64.6	31,315
EU15 countries	48.6	51.9	58.5	45,569
EU12 countries	53.0	30.4	58.5	18,779
Other Western countries	25.0	29.2	40.5	19,752
All Western countries	**46.4**	**47.1**	**57.9**	**115,415**
Other European countries	51.4	63.1	46.7	10,766
Central and South America	37.0	25.3	30.9	7,297
Asia and Oceania	52.0	43.7	46.6	23,480
Africa	48.3	59.4	57.4	8,181
The Middle East	65.0	67.2	66.0	15,691
Unknown origin or stateless	74.4	71.1	74.5	320
All non-Western countries	**56.1**	**54.2**	**48.6**	**65,735**
Total	**49.5**	**49.9**	**54.6**	**181,150**

Source: Own calculations.

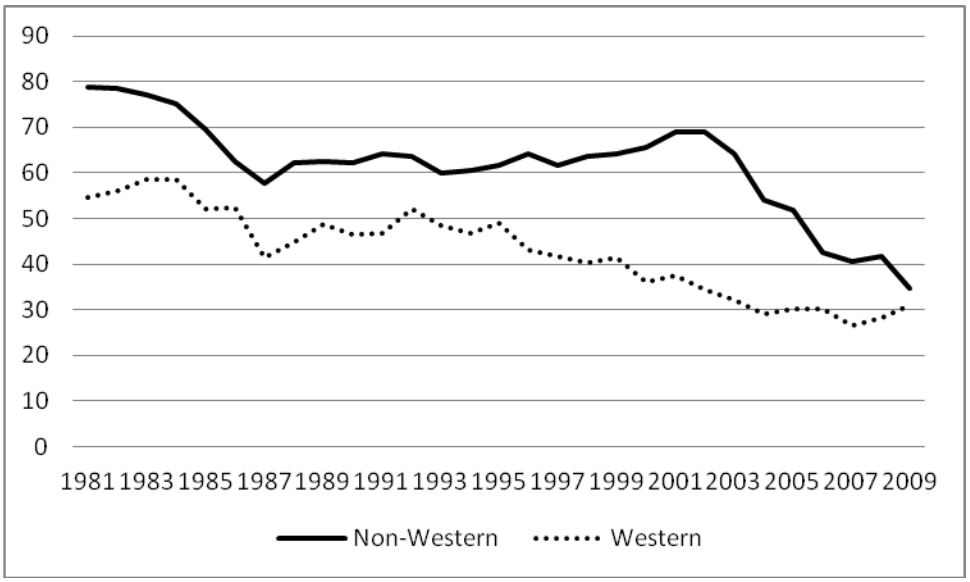
Non-Western original immigrants is however a heterogeneous group. This can be clearly seen from an examination of the distribution by area. Of the original immigrants from non-Western

countries, it was primarily immigrants from the Middle East and Africa (refugees) who moved into their own homes, while immigrants from Central and South America, and to a lesser extent from Asia and Oceania, often moved in with Danes.

Among the immigrants of Western origin, the proportion moving into their own homes was relatively high for people from the Nordic Region and the EU15 countries, because many came to Denmark to work or study. In contrast, among other Western immigrants there was a tendency to move in with Danes.

Figure 2 shows that the proportion of reunification immigrants with close family members in Denmark accounted for nearly 80% of all reunification among non-Western immigrants in 1981. The proportion declined to 60% in the course of the next five years, and remained at approximately that figure until around 2001, after which it fell to something over 30% in 2006. For Western immigrants there is a decline from over 50% in the 1980s to 30% in the 2000s.

Fig. 2 Proportions of Reunification immigrants who joined close family members, 1981-2008, %



Notes: Year of immigration
Source: Own calculations

These aggregate proportions are strongly influenced by the nationality compositions of the groups, since there are large differences between the proportions for different nationalities.

While the proportions among both Western and non-Western groups have fallen since the 1980s, it is primarily among the non-Western immigrants that reunifications with family members have come to account for a smaller proportion of the total since 2000. This development coincides with the tightening of restrictions under the Aliens Act, whereby the "24-year rule" and the requirement for ties with Denmark hit non-Westerners hardest. However, as we shall see below this development is also a consequence of the less restricted access for students and work-related immigrants.

When these figures are separated out according to area and sub-period, it becomes evident that even though there has been a generally downward trend, there are differences between the different areas (see TABLE 5). The EU12 countries and the Other European countries (in Eastern Europe) in particular have witnessed a fall in family-related reunification. Such reunifications have also declined among other groups, but not to the same degree, while for immigrants from Africa, from the Middle East, and the stateless and immigrants of unknown origin the proportion of family-related reunifications in relation to all reunifications has increased.

Table 5 Proportions of Reunification immigrants who joined close family members, 1981-2008, %

	1981-1989	1990-1999	2000-2008	No. Obs.
	%	%	%	N
Nordic Region	53.8	44.0	38.6	31,315
EU15 countries	48.4	47.8	33.9	45,569
EU12 countries	69.0	45.9	22.7	18,779
Other Western countries	39.8	37.1	32.9	19,752
All Western countries	**51.4**	**44.9**	**30.9**	**104,265**
Other European countries	83.0	66.2	37.8	10,766
Central and South America	62.4	50.4	40.5	7,297
Asia and Oceania	61.5	63.0	48.8	23,480
Africa	57.3	52.5	62.9	8,181
The Middle East	67.8	65.6	71.5	15,691
Unknown origin or stateless	54.6	52.1	62.3	320
All non-Western countries	**66.2**	**62.6**	**54.0**	**151,045**
Total	**60.5**	**56.9**	**43.0**	**255,309**

Source: Own calculations.

Once again, the EU12 countries stand out from the rest. It is clear that the increase in the proportion of reunifications cannot be related to family reunifications, but points instead to the immigration of some other network.

5.2 The Immigration Multiplier

In this section we present the aggregated immigration multiplier as well as multipliers for different countries and regions of origins. We begin with the first round multiplier and divide that into a direct contribution from reunification and the contribution that comes from the children of the original immigrants. The number of reunifications is counted from the date of the original immigration up until 2008.

In order to be able to follow the migration-chain for a long period we focus in this section on the original immigrants who arrived in the period 1981-1990. As Table 6 shows there were 43,630 original immigrants who arrived in this early period, and on the basis of these immigrants we calculate the immigration multiplier up until 2008. The largest number of original immigrants in the sample came from the EU15 countries (12,533), followed by the Nordic Region and Other Western countries (7540 and 7023 respectively). The next two columns show the ratios between the number of direct reunifications (reunification immigrants and second generation immigrants) and the number of original immigrants. There is a very wide spread among the ratios for reunification immigrants (RI), ranging from around 2.5 reunification immigrants per original immigrant for the stateless and people of unknown origin to only 0.2 reunification immigrants for each original immigrant from Other Western countries. A part of this diversity can naturally be attributed to the purpose of residence in Denmark (see below). For the second generation immigrants (2I) born to original immigrants after their arrival in Denmark, the spread is also very broad. With immigrants from the Middle East accounting for around 1.3 second generation immigrants per person, and the figure for immigrants from the Other Western countries once more being very low at 0.2. The total first round multiplier is therefore greatest for people of unknown origin and the stateless (4.5), followed by immigrants from the Middle East (3.9).[9]

[9] The multiplier includes the original immigrants.

Table 6 The first round multiplier and total multiplier by country of origin

	No. Of Original immigrants	---------- Ratio to original immigrants ----------				1. round multiplier, (IM1)	Total multiplier (IM)
		Reunification immigrants (RI)	Second generation immigrants (2I)	Reunified to reunification immigrants (RRI)	Reunified to second generation immigrants (R2I)		
Nordic Region	7540	0.59	0.40	0.09	0.01	1.99	2.09
EU15 countries	12,533	0.46	0.53	0.07	0.01	2.00	2.08
EU12 countries	2271	0.93	0.58	0.31	0.01	2.51	2.83
Other Western countries	7023	0.24	0.17	0.04	0.00	1.41	1.45
All Western countries	**29,367**	**0.48**	**0.42**	**0.09**	**0.00**	**1.90**	**1.99**
Other European countries	804	1.08	0.93	0.28	0.04	3.00	3.32
Central and South America	1384	0.51	0.58	0.14	0.01	2.09	2.25
Asia and Oceania	4271	1.24	0.84	0.66	0.04	3.07	3.77
Africa	1590	0.93	0.93	0.41	0.04	2.86	3.31
The Middle East	6066	1.59	1.26	0.66	0.05	3.85	4.57
Unknown origin or stateless	148	2.51	1.00	1.15	0.07	4.51	5.72
All non-Western countries	**14,263**	**1.29**	**1.01**	**0.57**	**0.04**	**3.30**	**3.91**
Total	**43,630**	**0.74**	**0.61**	**0.24**	**0.02**	**2.35**	**2.61**

Source: Own calculations

Indirect immigration is also calculated, i.e., immigration of the second round, and presented in the next two columns. Indirect immigration comprises reunifications with reunification immigrants (RRI) and second generation immigrants (R2I) from the first round which do not involve the original immigrant. For example, the child of an original immigrant may marry a spouse from overseas after moving out of the parental home. Only reunification immigrants are taken into account in the second round, not children of second generation immigrants. There are two reasons for this. First, the children of second generation immigrants cannot be distinguished from Danes in the statistics. Second, the time horizon for the study is not sufficient to permit the calculation of a longer chain.

A very large proportion of the original immigrants from the West come to Denmark to study (young people), while those who come to Denmark to work typically bring their families with them. Another important factor is the distance from and situation in the home country. For example, conditions in Turkey may contribute to promoting immigration to Denmark.

The differences between areas of origin in the second round are similar to those of the first round. But the second round produces a somewhat lower multiplier. Family reunification cannot in the nature of things be as great in the second round, because some members of the family have already arrived in the country. Moreover, the second generation immigrants could not be older than 28 in 2009. Thus the second round effects are obviously not complete. However, since around half the reunification immigrants from the first round had left Denmark again by 2009, they will not contribute to further multipliers unless they return to Denmark in the future. Of the reunification immigrants still living in Denmark in 2009, around half were older than 38. These people will have established most of the family that they will have during their lives. It is therefore likely that the second round effect is only slidely downwards bias concerning the first round reunification immigrants. The second generation immigrants are somewhat younger, and many more of them were still living in Denmark in 2009 (more than 80%). The oldest among them were 28 years old in 2009, and family formation fare from being completed. Thus, the second round effect cannot be said to be complete. It is difficult to assess how much bigger the second round effect will eventually be.

The multiplier is also calculated separately for original immigrants who moved into their own homes on arrival and those who moved into a home with Danes. The results show that those original immigrants who moved in with a Dane brought in fewer people through reunification in the first round than those who moved into their own homes on arrival. On the other hand, the numbers of second generation immigrants related to this group are similar to those associated with original immigrants who moved into their own homes.

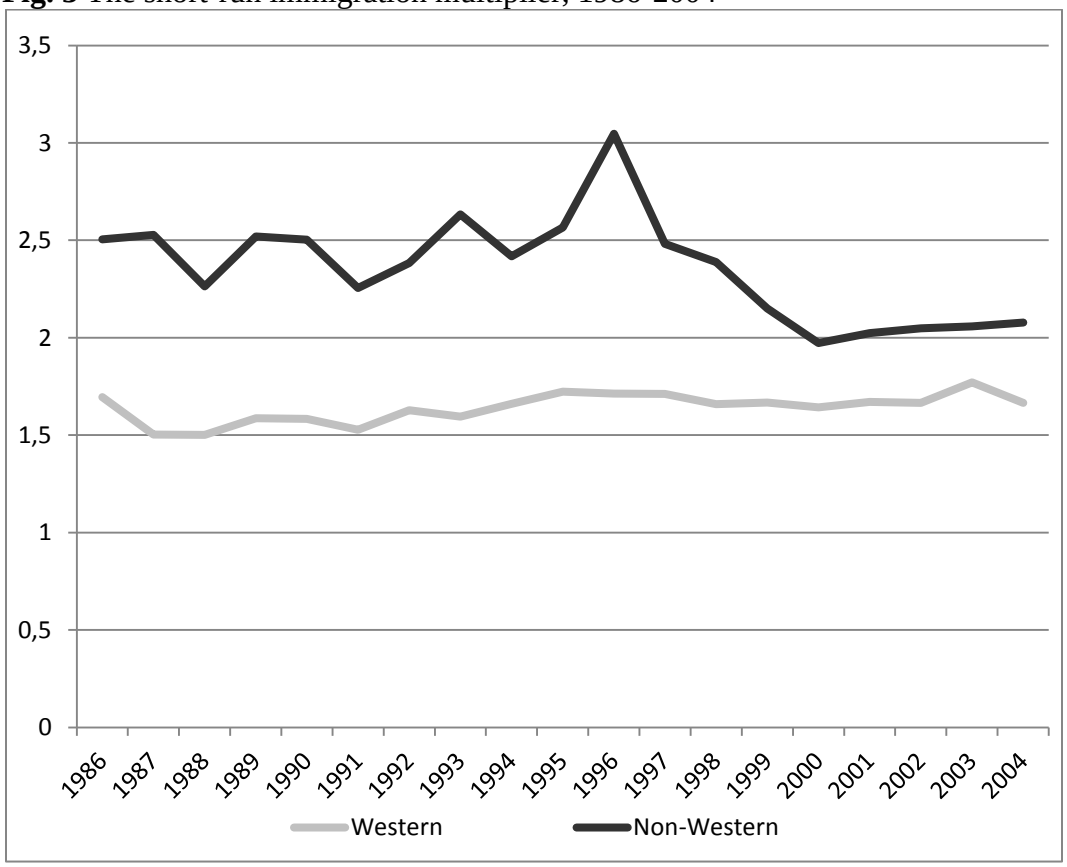
Does the immigration chain imply exponential growth of the immigrant population? The answer is no. The second round multiplier is much smaller that the first round. While the first round effect is considerable, probably because the original immigrants are relatively young and bring their families with them, the multiplier effect in the second round is smaller unity, and that will also be the case after the second round effect has had time to played our fully. The results can be compared with the results from Jasso and Rosenzweig (1986) for the USA. They find that the multiplier is around 2.4 (1.4 plus the original immigrant). This immigration multiplier excludes

descendants to immigrants. A more recent study for the USA is Yu (2006), who finds that the multiplier including descendants is close to 6.

5.3 The Short-run Multiplier

A closer examination of the data in our study shows that after five years 7 out of 10 reunifications have taken place and 5 out of 10 descendants are born. This suggests that a short-run multiplier, which only focuses on the five years following immigration of an original immigrant, will give a hint as to how large the multiplier will be. With data from 1982 to 2009 we are able to track trends in this 5-year multiplier. In Fig. 3 the development is shown for Western and non-Western countries.

Fig. 3 The short-run immigration multiplier, 1986-2004



Notes: Year of immigration of original immigrant.
Source: Own calculations

This shows a multiplier around 1.5 and increasing slightly over time for immigrants with Western origin. For non-Western immigrants the multiplier is close to 2.5 up to the mid 1990's,

with a maximum of 3 in 1996.[10] Following the peak it has decreased to around 2 in 2000 and remained constant ever since. Since the multiplier is forward looking, these numbers are consistent with changes in the Danish Alien Act in 1999 and 2000 and especially in 2002 (i.e. the multiplier for 1999 is affected by the Alien Act 1999-2004).

5.4 The Original Immigrant and the Short-run Multiplier

Until now the analysis of the immigration multiplier has been based on average values for different subgroup. However, when the calculation of the multiplier is based on individual register data it is possible to track exactly how many reunified immigrants each original immigrant has generated. Therefore we are also able to analyse how the personal characteristics of original immigrants affect the size of the short-run immigration multiplier.

To analyse this we introduce a model, where the size of the short-run multiplier SIM_i for each original immigrant i is explained by gender g_i, educational edu_i, age a_i, country of origin c_i, and time of arrival t_i, e_i is the error term.

$$SIM_i = \beta_0 + \beta_1 g_i + \beta_2 edu_i + \beta_3 edu_i g_i + \beta_4 a_i + \beta_5 c_i + \beta_6 t_i + e_i \quad (4)$$

The model is estimated by ordinary least squares and the result is presented in Table 7. The estimation is here presented in four different versions. The first model includes all 137,016 original immigrants for whom the short-run multiplier has been calculated, while the samples in the three other models are reduced due to missing information about educational level for some immigrants.

The explanatory variables in Model 1 are: gender, age at arrival, country of origin and year of arrival. The estimation results show that the multiplier is significantly higher for males than females. The expected value of the short-run multiplier in model I rises with 0.018 if the original immigrant is a male. The age at arrival seems to have an even larger effect on the short-run multiplier. The multiplier becomes larger with age at arrival until the age of 50-61, where the short run multiplier is 0.183 higher than among original immigrants arrived before the age of 18. After the age of 62 the short-run multiplier becomes smaller. This pattern seems very reasonable

[10] The spike in 1996 for non-Westerns original immigrants is due to that all refugees from the Balkan area were given residence permits, though they had already arrived some years ago.

as the family members that will follow the original immigrant usually are the spouse and children living at home.

Table 7 Multivariate analysis of short-run immigration multiplier

	Model I		Model II		Model III		Model IV	
Constant	0.0597***	(0.010)	-0.0249	(0.062)	-0.0332	(0.062)	-0.0490	(0.060)
Male	0.0186***	(0.002)	0.0272***	(0.004)	0.0187***	(0.006)	0.0263***	(0.007)
Primary					0.0193**	(0.006)	0.0296***	(0.007)
Tertiary					-0.0117*	(0.006)	-0.0163**	(0.007)
Primary*Male					0.0000	(0.008)	-0.006	(0.010)
Tertiary*Male					0.0260**	(0.008)	0.0276**	(0.010)
18-24	-0.0027	(0.011)	0.1001	(0.063)	0.0959	(0.063)	0.0950	(0.062)
25-34	-0.0119	(0.010)	0.0609	(0.062)	0.0647	(0.062)	0.0556	(0.060)
35-49	0.0366***	(0.010)	0.1094 †	(0.062)	0.1165 †	(0.062)	0.1068 †	(0.060)
50-61	0.1828***	(0.010)	0.2456***	(0.062)	0.2523***	(0.061)	0.2420***	(0.060)
62+	0.0555***	(0.011)	0.1425*	(0.062)	0.1484*	(0.062)	0.1498**	(0.061)
EU15	-0.0348***	(0.003)	-0.0407***	(0.056)	-0.0402***	(0.006)	-0.0382***	(0.007)
EU12	0.0004	(0.005)	-0.0079	(0.007)	-0.0075	(0.007)	-0.0001**	(0.008)
Europe - none western	0.1077***	(0.005)	0.1251***	(0.007)	0.1261***	(0.007)	0.1251***	(0.008)
Other western	-0.0474***	(0.004)	-0.0711***	(0.008)	-0.0723***	(0.008)	-0.0775***	(0.010)
Asia	0.0400***	(0.004)	0.0382***	(0.006)	0.0324***	(0.006)	0.0359***	(0.007)
America	-0.0607***	(0.006)	-0.0650***	(0.009)	-0.0671***	(0.009)	-0.0577***	(0.011)
Africa	0.0868***	(0.005)	0.1139***	(0.008)	0.1093***	(0.008)	0.0875***	(0.009)
Middle East	0.1240***	(0.004)	0.1372***	(0.006)	0.1329***	(0.006)	0.1443***	(0.008)
Unknown	0.2118***	(0.023)	0.2850***	(0.035)	0.2817***	(0.035)	0.3360***	(0.040)
Immigration year <= 1990	0.0038	(0.002)	-0.0090*	(0.004)	-0.0085*	(0.004)	-0.0118*	(0.005)
Immigration year <= 2000	0.0105***	(0.003)	0.0148***	(0.004)	0.0160***	(0.004)	0.0308***	(0.005)
R^2, adjusted	0,0543		0,0527		0,0532		0,0589	
No. of observations	137016		65080		65080		46900	

†p<0.1;*p<.05; **p<.01; ***p<.001

Source: Own calculations based on registerdata from Statistics Denmark.

Even when we control for differences in gender and age of arrival there are large differences in the multiplier between the country regions. Compared to immigrants from the Nordic countries immigrants from the EU generates less immigration (-0.035) as it is the case with immigrants from America and other Western countries. While immigrants from the non-Western part of Europe (0.108), Asia (0.040), Africa (0.087), Middle East (0.124) and unknown country of origin (0.212) generates considerable higher multipliers.

As noted earlier the Danish immigration rules regarding asylum and family reunification was tightened considerable around 2001, while rules regarding work permits was loosen. Consequently, one would expect to find lower short-run multipliers after 2001. This is also what is found at least for original immigrants that arrived in the period 1990 to 2000.

How are these results from Model I affected by the inclusion of educational background in the estimations? The conclusion from Model II to IV seems to be: Not much. In Model II the specification of the model is unchanged compared to Model I, but the sample now only consist of those 65,080 immigrants for whom Statistics Denmark can provide educational information. Which is all immigrants that have lived (for a short or long period) in Denmark after 1999. This reduction of the sample only imposes minor changes on the estimates. Most notably is the rising estimate of age at arrival compared to the basis-category (being less than 18 year old on arrival).

In model III the sample is unchanged from model II and the educational variable is introduced. Education is here measured by the levels: Primary, Secondary and Tertiary, where Secondary level is used as basis-category in the regression. An interaction term between gender and education is also included. Introducing educational level in the regression does not affect the other estimates. But we do find that educational level is important. In general it seems that the short run-multiplier declines with the length of education. However, immigrant males with a tertiary education tend also to have a higher short-run multiplier. So the overall picture is that for female immigrants the multiplier falls with educational length, while the lowest multiplier for males is found among those with secondary schooling.

In model IV the sample is further reduced to the 46,900 observations, where Statistics Denmark has the most accurate education information, as the 18,180 observations where Statistics Denmark has imputed the values of education are excluded. This reduction of the sample does not change the estimation results noticeable.

Therefore, the overall result remains that the short-run multiplier rises with age (at arrival) until the age-group 50-61. Males - and especially those with primary or tertiary education - have higher short-run multipliers. For women the multiplier is somewhat lower and declining with educational length. The multiplier is also lower for original immigrants arrived after 2000

compared to the previous period. There are large differences between country regions. The largest multipliers are found among immigrants with unknown or Middle East origin, but also the non-Western parRt of Europe. The lowest multipliers are found among immigrants from the EU-15 countries, America and other Western countries.

6. The Reproduction of Immigration and the Immigration Laws

In this section we discuss the latest changes in immigration laws in Denmark using the Short-run multiplier just presented. Major changes in immigration laws took place in Denmark between 1999 and 2004 (the Danish Alien Act in 1999 and 2000, and especially in 2002 there was major changes as described in the appendix D). Since the multiplier is forward looking, the picture in Figure 3 is consistent with these changes (i.e. the multiplier for 1999 is affected by the Alien Act 1999-2004). The short-run multiplier *effect*[11] for non-Western is reduced by 1/3 from 1.5 additional immigrants to 1 additional immigrant for each original immigrant. If we translate this proportional change to the long run multiplier, the reduction is even larger.

Apart from these general findings the results in Figure 3 also suggests that the changes in the Aliens Act around year 2000 did not have the same effect on immigration from Western and non-Western countries. In order to quantify this variation the analysis from Table 7 is repeated for the same four subsamples, but immigrants are divided into being non-Western or not, while year of migration is reduced to being before or after the reforms around 2000. All other variables: Gender, education and age at arrival are classified as before and the estimated value of these variables turns out to be quiet similar to those presented in Table 7.

The estimated values of the new variables are presented in Table 8. For non-Western immigrants the short-run multiplier is 0.110 higher than for Western immigrants according to Model I. After the reform the multiplier is in general 0.016 higher than before the reform, but for non-Western immigrants a large negative (-0.078) reform-effect is found. This seems to be in accordance with the intention of the reform that provided broader access for immigrants to work and study in Denmark, but also imposed larger restrictions on the access for refugees and family

[11] Not counting the original immigrants.

reunifications. Again, these results seems very robust to the different specifications of Model I to IV.

Table 8 Multivariate analysis of short-run immigration multiplier

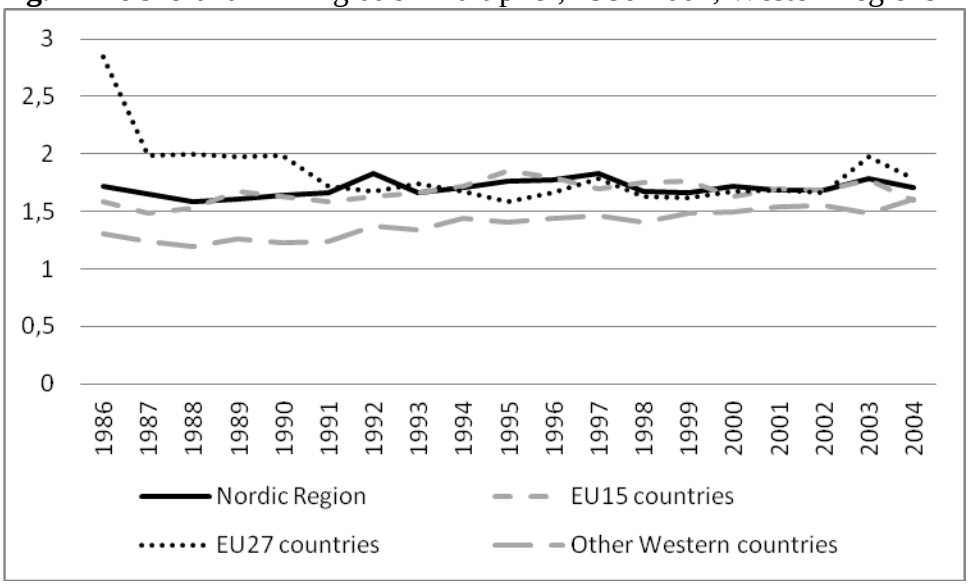
	Model I		Model II		Model III		Model IV	
Non-Western	0.1104***	(0.002)	0.1399***	(0.004)	0.1361***	(0.006)	0.1302***	(0.004)
Reform	0.0158***	(0.003)	0.0307***	(0.005)	0.0292***	(0.035)	0.0125†	(0.006)
Reform*Non-Western	-0.0775***	(0.005)	-0.1033***	(0.004)	-0.1033***	(0.004)	-0.0907***	(0.005)
R^2, adjusted	0,0468		0,0440		0,0444		0,0484	
No. of observations	137016		65080		65080		46900	

†p<0.1;*p<.05; **p<.01; ***p<.001

Source: Own calculations based on registerdata from Statistics Denmark.

The categories Western and non-Western are still very broad categories and therefore, we have disaggregated then further in FIGURE 4 and 5. Fig. 4 shows, that the Western countries have an almost identical and stable development in the short-run multiplier over time. The short-run multiplier displays cross sectional differences almost identical to the previous long run multiplier. Other Western countries have the lowest multiplier and EU12 countries have the largest. The figure also reveals that the high multiplier for EU12 countries holds mainly for the 1980's.

Fig. 4 The short-run immigration multiplier, 1986-2004, Western regions

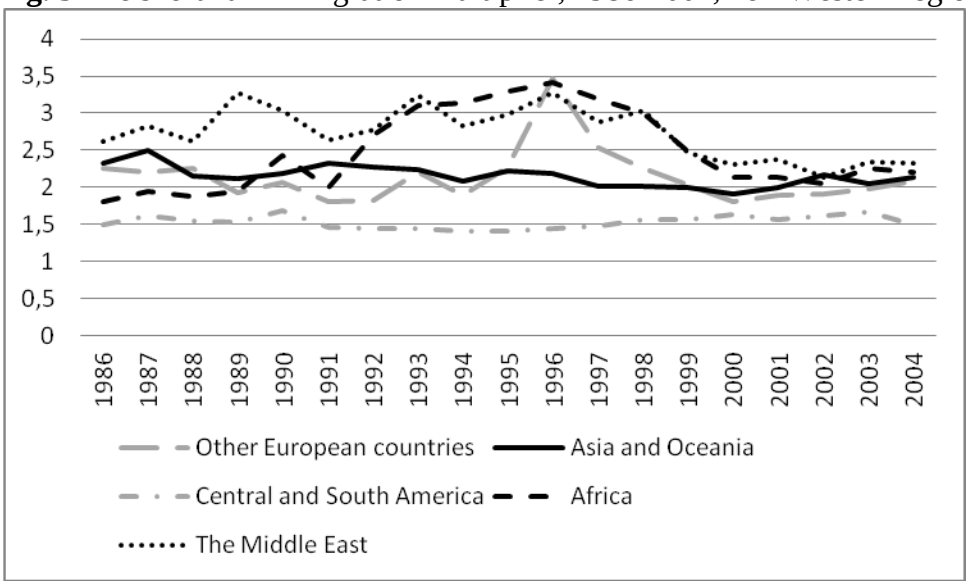


Notes: Year of immigration of original immigrant.

Source: Own calculations

The picture is more heterogenous and volatile for non-Western countries as shown in Figure 5. In general, countries from the Middle East use to have a high short-run multiplier of around 3. From 1998 and onwards it declined, however, to slightly less than 2.5. Central and South America have a stable, and the lowest, short-run multiplier, around 1.5. The one for Asia, which has been between 2 and 2.5 through the period, is very stable too. Also Other European Countries shows a stable pattern with a multiplier around 2. The only exception is around 1996, where there was a large influx of refugees from Balkan area. In general, the multiplier is higher for the non-Western regions, and some variation occurs mainly due to civil wars and consequently increases in the number of refugees. Thus the new stricter admission rules enacted after 2000 and mainly after 2002 had very hetorogenous effects across the different immigration groups. But not only was it immigration from non-western countries alone that was influenced, it was in fact only immigration form a subgroup of these countries that was affected, namely immigration form Middle East and Africa. This was the case even though the restrictions place on immigration by the new Aliens Act were all general and base on things like age and experience with the country.

Fig. 5 The short-run immigration multiplier, 1986-2004, non-Western regions



Notes: Year of immigration of original immigrant.

Source: Own calculations

7. Conclusion

In this paper an immigration multiplier is constructed. The multiplier is the number of subsequent immigrants generated by an original immigrant, who is coming to Denmark to live either in his or hers own house or with a Dane. The link between the original immigrant and the immigration he or she generates is the home address of the original immigrant. Using full population register data over an extended period of time, 1981-2009, we have constructed long run multipliers and looked at the trends in short-run multipliers by counting the number of immigrants moving into an original immigrants' home address. Moreover, we account partly for descendants to immigrants, by including children of original immigrants in the first stage, and we also include the descendant's connection to future immigrants.

This study has shown that allowing an original immigrant into Denmark in the 1980's increases the number of immigrants (and descendants) not with one person but with 2.6 persons on average. The dispersion across geographic and geopolitical regions is large. The largest multiplier is found for non-Western immigrants, 3.9. For smaller groups of non-western origin the multiplier can be as big as 5.5. For Western immigrants it is generally smaller, 2.0.

Another important result is that the chain element in immigration does not make immigration an accelerating process in Denmark. The second round will produce a much smaller multiplier than will the first round, given the immigration law in this country.

The demographics of the original and derived immigrants are mainly as expected, except that the gender ratio is less different. There are more male among the original than among the derived immigrants, but only 53% compared to 47%. But the original immigrants are young adults as expected and they are also much better educated than the derived immigrants, who on the other hand are somewhat younger than expected, which could account for the relatively low skill level upon arrival. With respect to age, the derived immigrants are more age dispersed than the original immigrants as we also expected.

As we have seen, the multiplier tent to be biggest for immigrants from poor countries as expected. With respect to socio economic characteristics, as expected we also fund that middle age men tend to derive the biggest subsequent immigration. With respect to the skill level we

find that low educated immigrants initiate the most derived immigration in general. However, looking at men in isolation, both low and highly educated immigrants derive more further immigration than does immigrants with an intermediated level of education.

Finally, the paper looks at the changes over time in the multiplier. This shows a first round short-run multiplier around 1.5 with a slightly increasing trend over time for immigrants with Western origin. For non-Western immigrants the multiplier is close to 2.5 up to the mid 1990's, with a maximum of 3 in 1996. Following the peak it has decreased to around 2 in 2000 and remained constant ever since. Since the multiplier is forward looking, these numbers are consistent with changes in the Danish Alien Act in 2000 and especially in 2002 (i.e. the multiplier for 1999 is affected by the Alien Act 1999-2004). The short-run multiplier *effect* for non-Western is reduced to 2/3 from 1.5 additional immigrants to 1 additional immigrant for each original immigrant. If we translate this proportional change to the long run multiplier, the reduction is even larger.

The multiplier we have constructed can also be used for analysing other important aspects of migration. For instance, concerning the order in which family members migrate. Is there a general order of this, or does it depend on the circumstances? Who moves first and arrive to the new country. As mentioned above, Borjas and Bronars (1991) agree with Mincer that the first link in the migration chain is more likely to be the person who has the most to gain individually from immigration. And therefore, who moves first among the family members of a migrant family is going to depends on there being positive or negative selection out of the sending country. If there is negative selection, the first link in the chain will have lower earnings than subsequent links in the chain. If the emigrants are forced out because of lake of opportunities then it is the family member that will be missed the least that will move first. And vise versa, if it is the golden opportunities in some potentially new home countries that inspires the aspiration to emigrate, then the family will send the strongest asset first, that is, positive selection.

The are some studies of the issue of positive vs. negative selection on behalf of individuals, for instance by Borjas and Bratsberg (1996) but no studies that try to use this logic to explain who

moves first among family members of migrant families.[12] The micro data multiplier presented here would be very useful for this purpose, but that is beyond to scope of this paper.

[12] Borjas and Bratsberg (1996) investigate the outmigration from the US of the foreign-born citizens. The results are quite different compared to what we would expect to happen within migrate families. Borjas and Bratsberg find that the return immigrants will be the least skilled immigrants if the immigrants are positively selected defined as immigrants have above-average skills. Correspondingly, the return migrants will be the most skilled immigrants if the immigrants are negatively selected.

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Appendix A. Sample selection

The separate components of the relatively large reduction in numbers of immigrants included in the study as described in Section 3 are shown in TABLE A.1 for immigrations in the years 1981 and 2008.

Table A.1 From total population to analysis population

	1981		2008	
	Number of observations	Proportion of register population	Number of observations	Proportion of register population
National statistics database	13,361		50,196	
Registers	9,736		43,810	
a. Danish origin	315	0.03	266	0.01
b. Second generation immigrants	262	0.03	866	0.02
c. Previously resident in Denmark	718	0.07	2,732	0.06
d. Student residence	652	0.07	3,853	0.09
e. Residential institution	235	0.02	218	0.00
f. Not in housing register	626	0.06	1,030	0.02
g. Information lacking about type of housing	3	0.00	877	0.02
h. Large household at year end	247	0.03	498	0.01
i. Large number of immigrants registered at address	0	0.00	119	0.00
Analysis population	6,678	0.69	33,351	0.76

Source: Own calculations

It can be seen that the requirement that the immigrant should not have lived in Denmark previously and the exclusion of those who lived in student residences were particularly significant in reducing the numbers in the study. In addition, the necessary information about a number of immigrants could not be found in the housing register, either because they are not listed in the registered or because information is lacking on the type of housing.

When the reduction is separated out by nationality, it can be seen that in 1981 the reductions were made in particular among Icelanders, Germans, Norwegians and the British, either because they went to live in student residences or because they had lived in Denmark previously. In 2008 the reductions were largest among Poles and Germans (either because they moved into student residences or because they had lived in Denmark previously), among Norwegians and Swedes (had lived in Denmark previously), and Chinese and Spaniards (went to live in student residences).

In 1981, it was the Vietnamese in particular for whom housing information was lacking or who moved into addresses where many immigrants lived, and in 2008 information about housing was lacking most frequently for Poles and Germans.

Appendix B: Implementation using Danish register data

In this appendix we explain the practical implementation of the computation procedure described in section 3.2. Even though *original immigrants* according to the definition may move into a residence with a Danish family, we disregard immigrant children below age of five doing so, as many of these are most likely children adopted by childless couples in Denmark.

If several people immigrate in the same year to the same address or to live with the same Danish family, one of the adults are randomly designated as being the original immigrant. The reason for doing this is that immigration is usually initiated by an individual, especially for reasons of employment. We then use the random assignment in these cases in order *not* to assume anything about these persons' characteristics, but instead be able to test it within the entire group of initial immigrants.

Family reunification immigrants are - as noted earlier - defined as those with close family members living at the same address at the end of the year of immigration. Close family members being children, parents or spouses. This means that reunification with, for example, siblings is not counted as family reunification, and nor is the formation of a cohabiting couple without a formal marriage counted as family reunification. The first of these limitations is likely to be of little significance, since family reunification between siblings is not allowed under Danish law. However, the second may have a relatively large degree of significance for comparisons between

countries of origin, in that family formation in, for example, Western countries often occurs without a formal marriage. For certain other nationalities, it is normal for partners to marry before they begin living together. Note that under Danish law family reunification does not require a formal marriage – only that the partners can document that they have previously lived together as a couple for at least 1½ years.

A number of reunifications recorded in the study will not involve close family members, or will be related to networks other than family. This is a desirable effect of the methodology. Consider, for example, an immigrant whose sister or cousin or previous neighbour immigrates to Denmark in order to work. Such an immigration would scarcely have taken place if it had not been for the immigrant already resident in Denmark, and should therefore be counted in the multiplier. On the other hand, in the case of other groups, especially asylum seekers, there is a risk that the number of reunifications will be over-estimated. For example, when local authorities take on responsibility for asylum seekers, they may for reasons of economy house many people in the same place of residence. This creates an artificial "reunification".

Network Reunification immigrants. As far as possible, the address used in the analysis is the first domicile at the time of immigration; but some information on the first address is missing from the refugee register for the years 1981-1985. For these years, the registered address at the end of the year of immigration is used instead.

Appendix C. The residence address method vs. The type-of-residence-permits method

Information about the grounds for granting residence permits in Denmark is available for the years 1997-2005. This Appendix compares the housing method, which is used in this report, with the results obtained by examining the grounds for the grant of residence permits. Some immigrants have several grounds for the grant of permits, since the conditions for their stay may have altered. The first reason for granting a permit is used here. In addition, it is not meaningful to consider immigrants from the Nordic countries, since they are automatically given residence permits without any further requirements. EU citizens must be issued with a residence permit, even though this is a formality.

The calculation is based on citizenship rather than country of origin. The grounds for the grants of permits are divided into asylum, EU/EEA citizenship, work and study, and family reunification. The geopolitical/geographical areas are defined as in the main report.

Table B.1 Grounds for granting residence permits, by geopolitical/geographical area and proportions classed as permits granted to original immigrants. First permit, 1997-2005

	Asylum		EU/EEA		Work and study		Family reunification	
	Number	Percent original	Number	Percent original	Number	Percent original	Number	Percent original
EU15 countries	0	.	33,073	54.8	1,552	59.7	2,847	81.8
EU12 countries	42	11.9	1,116	38.8	10,767	44.6	3,844	54.4
Other European countries	4,605	26.1	102	16.7	6,387	36.1	6,122	35.7
Other Western countries	1	0.0	237	24.9	8,757	57.1	2,629	81.8
Central and South America	24	25.0	144	25.7	2,716	63.8	2,498	72.7
Asia and Oceania	3,357	28.0	768	6.5	12,681	41.4	17,362	33.3
Africa	4,761	27.9	94	27.7	1,828	39.9	7,691	28.1
The Middle East	6,029	30.7	164	14.6	2,041	32.7	20,265	15.7
Unknown origin or stateless	933	15.4	17	58.8	64	29.7	958	10.0

Notes: The grounds for granting a permit are those for the first permit issued in the period 1997-2005.

Source:Own calculations

There are relatively few original immigrants among those granted asylum in comparison with what might be expected. This may be due in part to the types of housing offered to refugees by Danish municipal authorities. It may also be because it is considered better to be granted asylum than to be admitted to Denmark on grounds of family reunification. Grants of residence permits on the grounds of EU/EEA citizenship are given almost exclusively to EU15 nationals, and the majority of these – 54.8% – are registered in the study as original immigrants. Permits granted for work and study vary from area to area. In the case of nationals of the EU15 countries, Latin America and Other Western countries, the majority of such permits are granted to people classified as original immigrants. In the case of other nationalities, however, the minority of immigrants granted such permits are original immigrants. This may again have something to do with people living together in different ways. If for example an immigrant has come to study in Denmark as a result of membership of a network, it is desirable for this immigration to be

included in the multiplier, since the person would not have come to Denmark if the connection had not existed.

Finally, it can be seen that family reunification also varies greatly according to area of origin. In most cases there are few original immigrants who are classified as family reunification immigrants. This is true of the Middle East and of Asia and Oceania. On the other hand, family reunification immigrants from Other Western countries are primarily original immigrants, because they come to Denmark for family reunification with Danes.

Appendix D. Immigration to Denmark

Denmark is a relatively new immigration country. Up until mid-1960s there was net emigration in most years and those immigrants who did arrive mainly came from the other Nordic countries, Germany and the USA (Tranæs and Zimmermann, 2004). In many cases these immigrants were Danish expatriates returning home. In 1954 the Common Nordic Labour Market was officially established followed in the 1960s by the European Economic Community's common labour market, and Denmark received work related immigrants from these (EU) countries too. In the mid-1960s, many immigrants from outside the EU (primarily from non-Western countries) came to Denmark to work – prompted by a shortage of labour in Denmark. But at the start of the 1970s, with the first oil crisis and fear of a rising level of unemployment, Denmark became closed to all immigrants except those with specialised work skills, those from areas with free movement of labour to Denmark, refugees, and those arriving for family reunification. However, immigrants already in Denmark on temporary work permits did receive permission to remain, and later family reunifications reflected the mix of nationalities of these guest workers, and later of refugees admitted to Denmark (Matthiessen, 2009). This form of immigration is known as "chain migration", and this paper presents calculations – for various countries of origin – of the derived immigration; how many immigrants and how enters the country as the result of the original immigration of one person.

The number of residence permits granted for family reunification has been registered since 1988 (Mogensen and Matthiessen, 2002). During the period 1988 to 1991 the number of residence permits granted annually rose from 6,996 in 1988 to 8,517 in 1991. Due to tightening of the family reunification rules this number fell to 5,033 in 1993. But afterwards the number increased

again and reached 10,950 permits in 2001. In 2002 the rules was tightened once more and the number fell to 3,522 in 2005 slowly rising to 4,768 in 2010 (Statistics Denmark, 2011). In terms of the proportion of permits, residence permits granted for family reunification fell during the period 2001 to 2010 from just under 1/3 of all permits to a little more than 5%. Legislation introduced in the past few years has also resulted in a significant alteration to the mix of nationalities among immigrants. Greater restrictions on family reunification and asylum policies have resulted in a reduction in the number of immigrants coming from the Middle East, Asia and Africa, while the eastward extension of the EU in combination with the economic upturn from 2004 to 2008 has led to a massive increase in the immigration of labour from Eastern Europe. By calculating the immigration multiplier, it is possible to estimate how much immigration this new influx of labour will generate.

Regulations for obtaining a residence permit in Denmark

While immigration is determined by many factors, there is one important instrument that gives the host country the means of controlling the immigration multiplier: the regulations for obtaining a residence permit, and in particular the regulations for obtaining a residence permit on family reunification grounds.

Work and study. Immigrants were relatively free to enter Denmark for employment purposes until 1973, where the first oil crisis and the fear of high rates of unemployment led to a halt on employment-related immigration. However, those "guest-workers" (as they were known) who were already in the country were granted permanent residence rights. The restriction on entry applied only to immigrants from outside the Nordic Region and the EU; people from those regions were not subject to any restrictions. The ban on work-related immigration has remained in effect ever since, loosened only by attempts to institute a "green card" type of scheme designed to satisfy demand for certain types of labour. Until recently, study-related immigrants has primarily arrived from the other Nordic countries, whose citizens are not subject to the rules on residence permits (Jacobsen and Junge (2009)). The proportion of immigrants entering Denmark with study residence permits has increased in step with the growing number of courses taught in English at Danish universities.

Family reunification. Up until 1999, immigrants to Denmark had the right under Danish law to bring their close family members into the country if they had a permanent, employment or study residence permit. “Close family” in this context meant children, spouses and parents. However, only immigrants with permanent residence permits were entitled to bring their parents into the country. From 2000 onward, family reunification for a spouse required that the couple’s ties with Denmark should be at least as strong as those with the spouse’s home country. In 2002 this restriction was tightened further, in that the ties to Denmark had to be stronger than the ties to the spouse’s home country. Furthermore, the right of adult immigrants with permanent residence permits to bring their parents into the country was abolished. Finally, it was decided that family reunification was only to be permitted for immigrants over the age of 24. The spouse resident in Denmark is also required to be able to provide a suitable place to live and a bank guarantee of DKK 63,413 (in 2011), and may not have been a recipient of state benefits over the previous five years.

Asylum. Asylum is granted on humanitarian grounds and residence permits was original based on the Aliens Act of 1952 that gave asylum to persons meeting the conditions in the UN Refugee Convention. In 1983 the law was adjusted and the group of “de facto refugees” was also accepted. They did not meet the criteria in the UN Convention, but did have a well-founded fear of persecution (Tranæs and Zimmermann, 2004). At the same time it was made more difficult for the authorities to return asylum seekers. This law gave Denmark a reputation of being refugee-friendly (Kjær, 1995). The law has been tightened ever since, most pronounced in 2002 where the entry for asylum seekers were adjusted so that now only asylum seekers who meet the definition of a refugee under the UN Convention can be granted asylum.

Integration.The legislation on integration was originally targeted at refugees, since other immigrants usually have different links to Denmark. Nevertheless, very low rates of employment among immigrants led to a number of measures being taken to promote employment. From 1999 the introduction program was offered to all newly arrived immigrants (except EU-citizens and their family) and the program was extended from 1½ to 3 years. A lower social security benefit for newly arrived foreign citizens was introduced at the same time. Due to criticism that the rules discriminated immigrants the benefit level was later raised to the level for Danish citizens again.

However, in 2002 with the introduction of "starting out assistance", the benefit level was lowered once more, this time for all newly arrived non-EU immigrants and Danes, who had not been in the country for 7 out of the last 8 years. The introduction programme and the very low level of social security benefits were intended to promote employment among immigrants. The government has also restricted the access to obtain Danish citizenship on a number of occasions since 2001. It is required to have residence in Denmark for 9 years contrary to 7 years before. Moreover some minimum number of work and clean crime sheet can also be required.

While these initiatives were aimed at promoting the integration of immigrants into Danish society, they may also have had the indirect effect of discouraging migrants with little chance of getting a job in Denmark.