Spillover Effects of Stricter Immigration Policies

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Spillover Effects of Stricter Immigration Policies[a]

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Abstract

We evaluate the importance of spillover effects of national migration policies by estimating the effect of stricter rules on family reunification in Denmark in 2002 on migration to neighboring countries. We reach two main conclusions. First, we show that stricter rules for reunification lead to a clear and significant increase in emigration of Danish citizens with immigrant background. Most of the emigrants left Denmark for Sweden, a neighboring country in which reunification was possible. Second, we demonstrate that a significant fraction of the individuals that came to Sweden to reunite with a partner left the country again; within two (eight) years around 20% (50%) had left, with the absolute majority leaving for Denmark. Our results indicate that potential spillover effects from national migration policies should be taken into account when forming migration policy.

Keywords: Migration Policy; family reunification; international migration; spillover effects

JEL classification: F22; J12; J15; K37

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Contents

1 Introduction

The large variation in migration policies across the member states of the European Union (EU) has spurred an active debate on whether immigration policies should be set at the European or at the national level, a discussion that was propelled to the top of the European political agenda following the refugee crisis in 2015.[1] At the heart of the discussion lies the role of national migration policies as drivers of refugees' and other immigrants' location choices. Migration flows to different EU countries can be seen as communicating vessels, where changes in migration policies in one country affect migration flows to both that country and to other EU states. National migration policies may act as pull factors, affecting the initial choice of country for immigrants arriving in Europe. However, less generous migration policies in one EU country may act as push factors, creating spillover effects to neighboring countries.

In this paper we focus on push factors. We exploit a change in Denmark's family reunification policy to empirically test for spillover effects of migration policy. The reform made it much harder for Danish residents to reunite (or form couples) with partners from outside the EU. We examine if and to what extent the tougher immigration policies caused affected individuals to move abroad to be able to reunite with their partners. Applying a difference-in-differences design on detailed Danish register data, we find that the emigration rate of Danish citizens with immigrant background increases strongly. We further find that the most popular destination was Sweden, a neighboring country with, at the time, more generous rules for family reunification.[2] We also examine whether those that left did so indefinitely or returned at a later stage. To accomplish that, we use Swedish register data and identify all couples that reunited in Sweden as a consequence of the reform in Denmark. We demonstrate that a significant fraction of the individuals that came to Sweden to reunite with a family member left the country again; within two (eight) years around 20% (50%) had emigrated, the absolute majority moved to Denmark. Thus, the reform caused both an outflow from Denmark and later return migration.

Applying an interrupted time-series (ITS) design on Swedish data also confirms the robustness of our results based on Danish data, i.e. that the stricter rules for reunification led to a clear and significant increase in family-related migration to Sweden. Using an ITS design with a control group approach, we are also able to rule out alternative explanations to the strong inflow of migrants following the reform. In particular, we show that the year 2000 opening of the Öresund bridge that connects Copenhagen (the capital of Denmark) with Malmö (the third city of Sweden) cannot explain the inflow to Sweden that we observe around the time of the reform. We also exclude the possibility that Sweden became a particularly attractive destination for migrant couples from neighboring countries for reasons unrelated to the Danish reform by examining inflows from Norway and Finland.

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[1]Even though there are centrally set guidelines and minimum requirements for immigration policies within the EU, variation across countries remains.

[2]These findings are in line with the descriptive evidence presented in a Danish report by Schmidt et al. (2009), who, among other things, study out-migration propensities of ethnic minorities in Denmark following the reform. One important difference between our study and Schmidt et al. (2009) is that the latter is purely descriptive while we use a control group approach. Also, while we use the full set of affected individuals they limit their analysis to a couple of age cohorts.

To the best of our knowledge, we are the first to study the research question posed in this paper causally. Most of the existing studies use cross-country data and examine how differences in migration-related policies and institutions in host as well as destination countries are related to asylum seekers' choice of country (see, e.g., Hatton, 2009, 2016, Brekke et al., 2017, Ortega and Peri, 2009, Neumayer, 2004 and Böcker and Havinga, 1998). These cross-country studies do however suffer from unsolved endogeneity problems (stemming from the endogenous location choice of refugees); see the discussion in, e.g., Brekke et al. (2017).

We are only aware of one study that causally examines the role of a country's refugee policies on the number of asylum seekers (that is, an examination of the pull effect). Andersson and Jutvik (2018) make use of a quasi-experimental setting generated by a policy change in Sweden in September 2013 that was uniquely generous within an EU context; the policy change implied that all asylum seekers from Syria were to be granted permanent residence permits instead of temporary ones. Using high-frequency data, they find that the policy change had a large but fairly short-run effect on the number of Syrian asylum seekers to Sweden and that the pattern of Syrian asylum seekers to Sweden was inversely related to the number of asylum seekers to Germany. Among other things, the results in Andersson and Jutvik (2018) show that migration flows to different European countries can indeed be seen as communicating vessels, where changes in migration policies in one country affects migration flows to both that country and to other European countries.

Our results can also be interpreted through the lens of the determinants of international migration. In the neoclassical model of individual choice, potential migrants weigh the costs and benefits of different location alternatives and choose the location (country) that maximizes their utility (see, e.g., Borjas 1987). Residents of a country wanting to reunite with a spouse, are thus likely to weigh in the regulations on family reunification when deciding on whether to stay on in a country or move elsewhere. Our results give strong support to this notion.[3]

The paper is also related to the literature on welfare migration, which examines whether heterogeneous welfare policies within a country affect welfare-prone individuals' migration behavior and location choices (for example, stricter welfare policies in terms of stricter activation requirements imposed in one region may affect the in- and out-migration of welfare-prone individuals to that region; see, e.g., Brueckner (2000) and Edmark (2009)). The same underlying reasoning can of course be applied to location choices of migrants at the international level, if, as in our study, family reunification is important for the utility of migrants; some individuals will move to countries where it is easy to reunite with a spouse. Conceptually, the first two strands of the literature are very similar, but they seldom speak to each other, and our results are of relevance for both literatures.

The family reunification policy that we analyze in this paper is also interesting *per se*. Family reunification has been one of the most important channels of migration to the EU during the last decades, making it an important policy area that has been studied to a much lesser extent than the labor immigration channel (Hatton, 2014). Despite the

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[3]Similarly, the migration flow to a country that introduces stricter rules for family reunification is expected to diminish if the possibility to reunite is valued highly among (potential) immigrants.

directive on the right to family reunification that establishes common rules for family reunification in all member states with the exception of the United Kingdom, Ireland and Denmark, there is considerable room for member states to impose stricter conditions and still comply with the directive.[4] The types of conditions imposed at the national level, e.g. requirements on adequate housing and sufficient resources, vary across member states, which results in some countries being more generous than others in terms of the possibility of reunification.

The rest of the paper is organized as follows. In Section 2 we discuss the 2002 Danish reform that we exploit, the rules regulating family reunification in Denmark and Sweden, and the likelihood of couples reuniting in Sweden following the reform. In Section 3 we describe the Danish register data that we use, our methodological approach, and the estimated effects on emigration from Denmark. In Section 4 we turn to the analysis based on Swedish data. We first describe our data and empirical approach, and then present our findings. Finally, in Section 5, we conclude.

2 Stricter rules for family formation and marriage migration and its effects on affected individuals' migration behavior

In this section we describe the legal framework that regulates family reunification in Denmark, including the reform in 2002, explain how it affects family formation, and discuss why affected individuals might find the alternative of moving to Sweden attractive, as well as the legal framework that allows them to do so.

2.1 Family reunification policies in Denmark

Family reunification between Danish residents (including both citizens and non-citizens) and third-country nationals (non-EU citizens) is regulated at the national level, unless the Danish resident is a citizen who has exercised their freedom of movement right within the EU, in which case family reunification is regulated at the European level, under the Free Movement Directive (Van den Broucke et al., 2016).

During the decades before the policy that we study, two main changes took place in the rules guiding family reunification. The 1983 Danish Aliens Act introduced the automatic right to family reunification for close relatives of Danish citizens and residents. However, in 1992, the requirements were tightened such that reunification was generally not granted if the sponsor had not been a Danish resident for at least five years. Furthermore, the sponsor had to submit evidence that they could financially support the family member they wanted to reunify with (Hedetoft, 2006). These changes effectively brought an end to the automatic right to family reunification.

The next major change in rules came in 2002, and this is the reform that we exploit in this paper. The reform was announced in January 2002 and passed in June the same year (Skyt Nielsen et al., 2009). The changes include the introduction of: (i) the "24-year rule",

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[4]The directive determines the conditions for non-EU residents in a member state to be joined by their family members. For family members of EU citizens other rules apply.

according to which reunification on marriage grounds is impossible unless both parties are 24 years old or older, (ii) the attachment requirement, whereby the partners must show proof of a stronger affiliation to Denmark than to any other country, measured as their combined number of years of residence in different countries, (iii) adequate housing requirement, (iv) ability of the sponsor (i.e., the spouse living in Denmark) to provide financially for the family and evidence of the sponsor not having received social assistance in the year prior to the application, and (v) a bank collateral in case the family member benefits from social assistance after arrival (Rytter, 2013).[5]

The same year, the public income transfers to immigrants were cut through the introduction of the so-called "Start Help" program. The program targeted all individuals (immigrants and Danish citizens returning from abroad) who had not been residents in Denmark for at least seven out of the most recent eight years. Income transfers were cut by around 35%. Hence, on top of the stricter requirements for reunification that were introduced in 2002, potential cash transfers to partners successfully fulfilling the new requirements were lower after the reform, which would make them more vulnerable economically.

Further changes with regards to family reunification have occurred in subsequent years. During our study period, the "biggest" change came in July 2005. From then on, applicants for family reunification have had to sign a "declaration of integration", whereby they commit to making an effort to integrate. This reform should however be considered small in comparison with the changes in 2002.

Figure 1 shows the number of family ties permits granted in Denmark between 1997 and 2009 and is suggestive of the reforms in 2002 having reduced the flow of tied family members to Denmark, both immediately and in the long-run.[6]

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[5]In 2003, the attachment requirement was somewhat loosened. Thereafter, the requirement could be waived if the sponsor had been a Danish citizen for at least 28 years, or was born in Denmark and had resided in the country for at least 28 years. The required years of residence was reduced to 26 years in 2006. The 2002 attachment requirement replaced a similar requirement introduced in 2000 but that only applied to foreign citizens; the 2002 requirement applies to Danish citizens as well.

[6]The figure captures the number of permits granted to both spouses and other family members; it should however be noted that our focus is on permits granted to spouses only.

Figure 1 – Number of permits granted on family grounds in Denmark
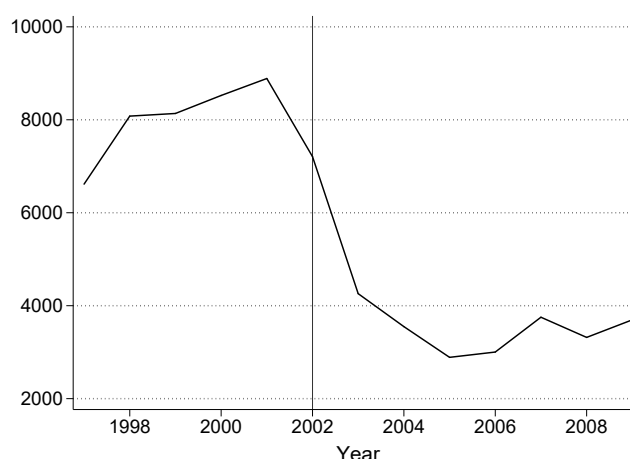
2.2 Spillover effects: Why would families choose to reunite abroad and what makes Sweden an attractive alternative?

The fact that family reunification in Denmark became more difficult in 2002 suggests that Danes and foreign residents residing in Denmark wanting to (re)unite with a partner had to move abroad or abstain from getting married if not fulfilling the criteria for reunification. In this section we argue that Sweden was (and still is) an attractive destination for those wanting to reunite, both in terms of the regulations of family reunification and geographic closeness.

First, Sweden is one of two countries that has a close border connection to Denmark (the other one being Germany); see the left-hand side map in Figure 2. Second, the most southern region of Sweden (Skåne) is easily accessible from the part of Denmark in which a large part of individuals affected by stricter reunification rules reside (c.f. the right-hand side map in Figure 2), which zooms in on the area in the left-hand side map in Figure 2 covering the most eastern island in Denmark, Zealand, and the most southern region in Sweden, Skåne). As can be seen from the map, the Copenhagen region in the southern part of Zealand is geographically very close to the Malmö region in the south of Sweden. Traveling across the Öresund bridge that connects Copenhagen with Malmö (the third city of Sweden) takes around 30 minutes. Also, North Zealand is closely connected to the Helsingborg region in Skåne: the ferry between Helsingör (on the Danish side of the border) and Helsingborg takes around 20 minutes.

Figure 2 – Denmark and neighboring countries (left); Zealand, Denmark and Skåne, Sweden (right)

Third, the short distances within the Öresund region, and the cultural and linguistic similarities between Denmark and Sweden imply that the actual moving costs should be relatively low in comparison with a move to other countries.[7]

Fourth, at the time the rules under which affected individuals could apply for reunification in Sweden were more generous than the Danish rules. Two legal frameworks regulate the possibility of family reunification in Sweden. Since 1954, Nordic citizens (including Danish citizens) are allowed to reside and work in any Nordic country without a residence or work permit. By virtue of this agreement, a Danish citizen who moves to Sweden and wishes to bring his/her spouse to Sweden via family reunification could do so in accordance with Swedish rules. Non-EU spouses are generally allowed to apply for a residence permit from Sweden provided that the couple had already lived together outside of Sweden as a married couple or in a registered partnership. If that is not the case, the non-EU partner planning to marry or cohabit with the Danish citizen had to apply from their country of origin.[8] If the application was successful, the foreign spouse obtained a residence permit that was valid for two years, after which it was possible to apply for a permanent residence permit. At the time, there were no income and accommodation requirements and there was no minimum period of legal residence required in order to qualify for family formation/family reunification, both partners however had to be at least 18 years old (Pascouau et al., 2011).

The other legal framework follows the Free Movement Directive at the European level

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[7]For example, the short distance suggests that the travel costs and the costs of transportation of goods (furniture etc.) should be limited. Another advantage is that migrants moving from the Copenhagen area can keep their jobs in Denmark (as long as they settle within a reasonable commuting distance in Sweden). The short distance also means that it is easy to stay in touch with (or meet) friends and relatives on the other side of the border. In addition, the extensive linguistic and cultural overlap between the two countries means that Danish normally can be understood in Southern Sweden and that integration into Swedish society should be relatively unproblematic.

[8]The application processing time may vary. There is no yearly data on average decision times but as of July 2016, it could take even up to 18 months for applicants from certain countries of origin. However, in the early 2000s, the processing times were probably much lower.

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discussed above. EU citizens who exercise their freedom of movement right within the EU may apply for family reunification under EU law, regardless of the nationality of their partners. Danish citizens moving to Sweden fall under this category. Family reunification is possible as long as the sponsor can provide proof of legal residence in Sweden (i.e. document their status as a worker, a self-employed person, a student, a pensioner or a person with sufficient resources).[9] If a residence card is granted following EU law, it is valid for five years, after which the non-EU partner can apply for a permanent resident permit.[10] For people who have been granted a residence permit in an EU country, family reunification is possible in accordance with the EU Family Reunification Directive (Council Directive 2003/86/EC on family reunification). The possibility for non-EU-citizens in Denmark to move to other EU-countries is however limited as Denmark does not grant long-term residence status to third country nationals due to Denmark's special arrangements for immigration and asylum policy. Long-term residence status is a requirement for free mobility within in the EU, thus the possibility for this group to move to Sweden to reunite with a partner is limited.

Regardless of the set of rules under which the couple reunifies, the couple can go back to Denmark (the home country of the sponsor) and obtain family reunification rights under the Free Movement Directive. Alternatively, if the couple spends enough time in Sweden, the non-EU partner can obtain Swedish citizenship and therefore move to Denmark under the Nordic agreement.

Finally, it can also be noted that there is a Danish organization, "Aegteskab Uden Graenser" ("Marriage Without Borders") that provides legal counseling to people affected by the reform. They give information on both the Swedish and the EU rules (which can of course be applied for moves to Germany, for example), but stress that the Swedish rules may be more favorable because it takes less time until the partner is able to obtain a permanent residence permit (two vs. five years under EU rules).[11] Furthermore, the Swedish rules at the time imposed no maintenance requirements, whereas under EU rules the sponsor has to prove they are undergoing some kind of economic activity, as explained above.

Taken together, these reasons make Sweden an attractive and very plausible alternative for reunification purposes for those affected by the reform. The arguments for going to Germany for reunification purposes are weaker, and as is clear from the emigration rates from Denmark very few, if any, of the affected individuals seem to react to the reform by going to Germany.[12]

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[9]In case the couple is not married or not in a registered partnership, family reunification *cannot be granted* under EU rules. Note the contrast with Swedish rules, where the intention to marry or cohabit with someone in Sweden is sufficient as long as one can prove the relationship is genuine.

[10]Note that referring to the residence permit as such under Swedish rules and as residence card under EU rules is not by chance; this is the distinction that the Swedish authorities make.

[11]See http://aegteskabudengraenser.dk/raadgivning/sverigeeu for the information the organization promotes (in Danish). (The page was last visited on May 28, 2018.)

[12]Statistics on this will be provided in the next section.

3 How did the Danish reform affect emigration from Denmark?

The aim of this section is to analyze whether the 2002 reform increased emigration rates of Danish residents who were affected by stricter rules for family reunification. We start off by describing the Danish register data that we use and how we define the group affected by the reform. Next, we proceed by providing some descriptives that are indicative of the reform causing an outflow individuals in the treatment group. We then present formal statistical analysis for the effect of the reform on emigration to Sweden. We provide statistical inference on the change in emigration rates of affected compared to unaffected residents in a repeated cross section analysis. Additionally, we show how Kaplan-Meier survival estimates differ between treated and untreated individuals when following a fixed cohort over time after the reform.

3.1 Danish register data

To analyze how the tightening of family reunification rules has affected outmigration from Denmark we use Danish full population register data for the years 1995 to 2009. The data combines administrative information on socio-economic characteristics of individuals residing in Denmark, such as their age, residence municipality and family status. For each resident we can link these characteristics with migration data including the date of emigration and the destination country. In Denmark, it is compulsory to report outmigration if someone leaves the country for more than six months. Furthermore, the full population data also allows us to merge data of partners who are married or registered at the same address in Denmark.[13]

3.2 Which Danish residents were affected by the 2002 policy reform?

Family reunification in Denmark is regulated by the national policy if a Danish resident is either a Danish or non-EU/EEA citizen and the partner is non-EU/EEA citizen. In this case residents who want to reunite with their spouse from a non EU/EEA country in Denmark have to fulfill the stricter requirements imposed by the 2002 reform or move to another country where they face fewer/no restrictions. We restrict attention to individuals who were 18 years or older in a given year. In our subsequent analysis we focus on Danish citizens as they can easily move to a neighboring country and apply for family reunification under the EU regulation.[14] We define a treatment group affected by the 2002 change in the Danish family reunification policy and a control group that was not directly affected by the policy change. We consider single Danish citizens not cohabiting with a partner in Denmark as our treatment group that faces stricter rules for potential family reunification after the reform. In our control group we consider Danish citizens who cohabit with a

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[13]See Appendix A1 for more details on the Danish data and sample selection.

[14]We also analyzed emigration behavior of non-EU/EEA citizens who were affected by the stricter migration policy but could not easily move to a neighboring country in order to reunify with their spouse under EU law (see the discussion in Section 2). Figure B.8 in the Appendix shows no migration response of non-EU/EEA citizens to the reform and confirms the restriction on the population of interest.

non-EU/EEA partner. This implies that the partner must hold a residence permit in a given year and those in the control group should not be affected by the family reunification reform.

3.3   Empirical results on emigration from Denmark

We start by analyzing whether emigration rates in the treatment group affected by the reform (as defined in the former section) increase after stricter reunification requirements were implemented. We analyze repeated cross section data which are summarized in Table 1. The table presents average characteristics of individuals who are in the treatment and the control group in a given year, pooled over the sample period. Individuals in the treatment group are singles, while individuals in the control group are cohabiting or married with a non-EU-citizen. We present summary statistics for all individuals in the treatment group in Column 1 and all individuals in the control group in Column 3. Columns 2 and 4 restrict both groups to individuals with immigrant background.[15] Given our definition of treatment and control group demographic characteristics differ between the groups. The treated individuals are considerably younger and fewer have children. Table 1 shows that a large fraction of individuals live in Zealand, the most densely populated region in Denmark, including the capital city, Copenhagen. There are no big differences between treatment and control group regarding the share of Zealand residents, only the share of Zealand residents without immigrant background in the treatment group seems to be slightly lower. The share of individuals born in Denmark and the share of females is higher in the treatment group. Among those with immigrant background Turkey and Pakistan are the two most important countries of origin in both treatment and control group.

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[15]Danish citizens with an immigrant background were either born abroad or born in Denmark to parents that were both born abroad and non-Danish citizens.

Table 1 – Descriptive statistics

	Treatment group		Control group	
	All	With immigrant background	All	With immigrant background
Age	32.89	28.78	39.42	37.47
Female	41.46%	41.54%	33.00%	32.67%
Any children	7.03%	7.32%	59.84%	74.80%
Zealand residents	47.25%	65.85%	62.60%	68.71%
Born in Denmark	98.42%	37.81%	63.98%	12.60%
Country of origin				
Turkey	0.30%	11.79%	11.63%	28.22%
Pakistan	0.20%	7.85%	5.12%	12.42%
Former Yugoslavia	0.12%	4.63%	2.25%	5.46%
Bosnia	0.09%	3.33%	1.03%	2.50%
Observations	12,278,256	317,534	464,310	191,377

Source: Calculations based Danish register data.

Notes: The treatment group are Danish citizens, older than 18 years, not cohabiting with a partner in a given year in Denmark. The control group are Danish citizens, older than 18 years, cohabiting with a non-EU/EEA citizen in a given year in Denmark. Citizens with immigrant background are born abroad or born in Denmark and both parents do not hold Danish citizenship. The reported countries include Denmark and the four most important countries of origin of the population with non-EU/EEA background in Denmark during the studied time period.Reported numbers refer to averages over the sample period 1995-2009.

Figure 3 plots the yearly emigration rates to all foreign destinations for the treatment group as well as for the control group from 1995 to 2009 (with the vertical line indicating the reform year). Panel A in Figure 3 includes *all* individuals in the treatment and control group in a given year. Even though all of the individuals in the treatment group are theoretically affected by the reform, the majority of them are probably not *de facto* affected (namely those that would not have brought a partner from a non-EU country even in the absence of the reform). Assuming that those with an immigrant background on the parental side were more affected than those with Danish-born parents, we restrict the sample to Danish citizens with an immigrant background in Panel B. Narrowing the sample down even further from the one in Panel B, we use in Panel C Danish citizens with immigrant background from one of the four most important countries of origin in Denmark: Turkey, Pakistan, Bosnia, and ex-Yugoslavia (these countries account for more than 50% of the population with non-EU/EEA immigrant background in Denmark during the considered time period).

Figure 3 – Yearly emigration rates of treatment and control group.
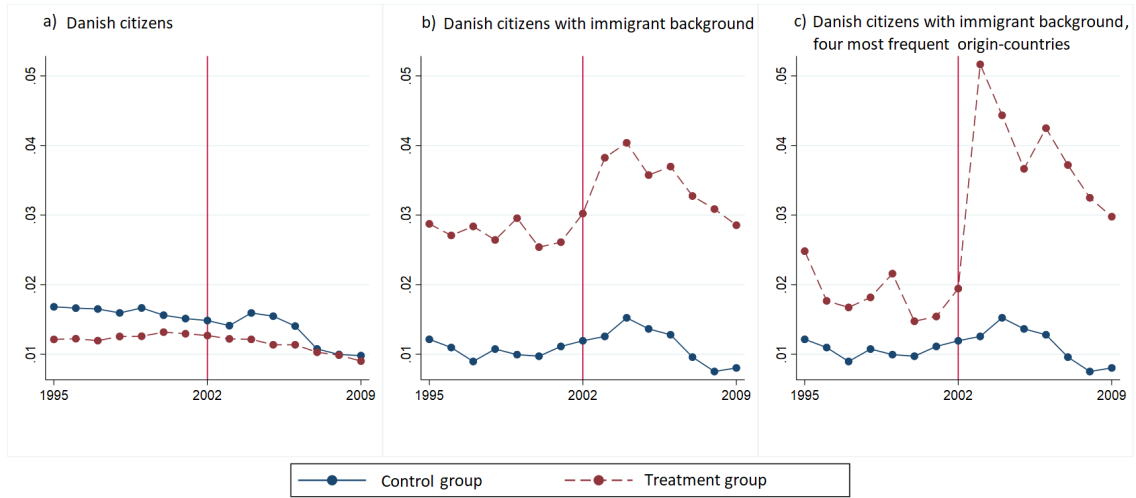
Source: Calculations based on Danish register data.

Notes: The treatment group are Danish citizens older than 18 years, not cohabiting with a partner in a given year in Denmark. The control group are Danish citizens older than 18 years, cohabiting with a non-EU/EEA citizen in a given year in Denmark. Four most frequent origin-countries are Turkey, Pakistan, Ex-Yugoslavia and Bosnia.

Figure 4 – Yearly emigration rates of treatment and control group to Sweden.
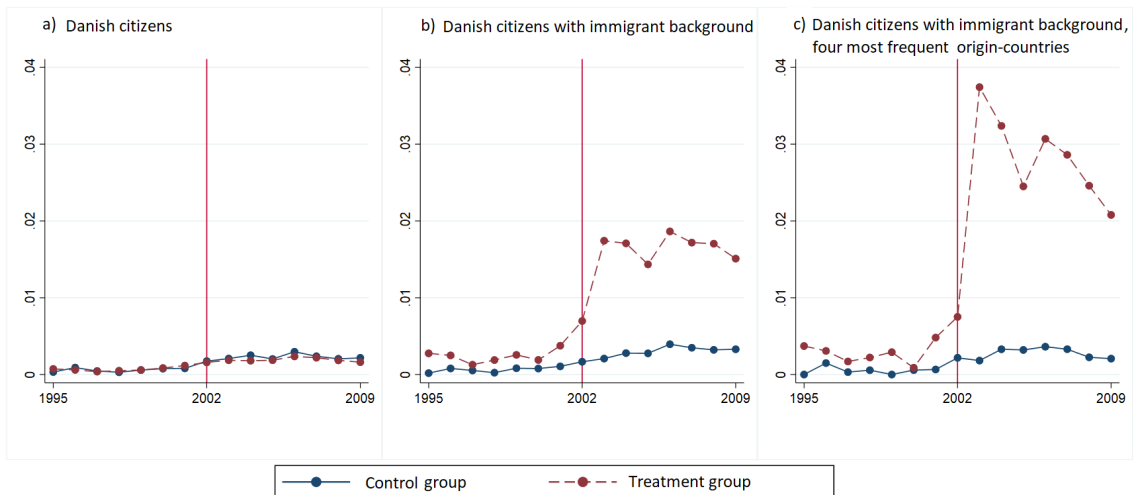
Source: Calculations based on Danish register data.

Notes: The treatment group are Danish citizens older than 18 years, not cohabiting with a partner in a given year in Denmark. The control group are Danish citizens older than 18 years, cohabiting with a non-EU/EEA citizen in a given year in Denmark. Four most frequent origin-countries are Turkey, Pakistan, Ex-Yugoslavia and Bosnia.

From Figure 3, Panels B and C strongly suggest that the reform had an effect on single Danish citizens with an immigrant background. For example, among the four most frequent origin-countries 1.6 percent of the affected group emigrated from Denmark the year before the reform (2001) the corresponding figure was 5.4 percent the year after the reform (2003) (see Panel C). For the control group, there is far less movement in emigration rates around the reform year. While we see a similar pattern in Panel B, there is no visible movement in Panel A for the full (theoretical) treatment group (indicating that the reform had no large impact on emigration rate among single Danish citizens without an immigrant background).

Figure 3 showed emigration to all destinations. However, as argued earlier, Sweden is an especially attractive country to emigrate to for family reunification. We therefore next examine what the emigration rates to Sweden looked like. Figure 4 shows corresponding panels as in Figure 3, but for emigration rates to Sweden only. Again, panels B and C strongly suggest that the reform lead to an outflow of Danish citizens with immigrant background to Sweden. In addition, comparing the emigration rates in Figures 3 and 4 it is clear that a very large fraction of the emigrants moved to Sweden after the reform (over 72 percent when looking at the emigration rate in 2003 for the treated group in Panel C in the two figures; 3.9/5.4).[16] [17]

The geographical distribution of the increase in emigration rates on the municipality level depicted in Figure 5 indicates that those migrants moving to Sweden originate mostly from the neighboring municipalities in Zealand.

The dynamics in emigration rates for treatment and control group around the date of the Danish family reunification policy reform show that individuals with immigrant background moved out of Denmark after the reform. The presented descriptive evidence indicates that Sweden is *de facto* an attractive destination country for those residents affected by stricter rules for a potential family reunification.

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[16]The pattern is consistent with the descriptions found in Schmidt et al. (2009).

[17]We also provide emigration rates to Sweden on a half-year basis in Figure B.1 showing that the increase in emigration rates to Sweden in 2002 can be attributed to the second half of the year in which the reform was implemented. In the Appendix Figure B.2 we show that emigration rates among individuals in the treatment group also increased for outmigration to Germany; compared to migration to Sweden the observed patterns are however much weaker; Also, in terms of individuals they are very few as Figure B.3 shows.

Figure 5 – Average migration rates to Sweden, Danish citizens with immigrant background in the treatment group by municipality, a) 1995-2001, b) 2003-2009.

a)

b)
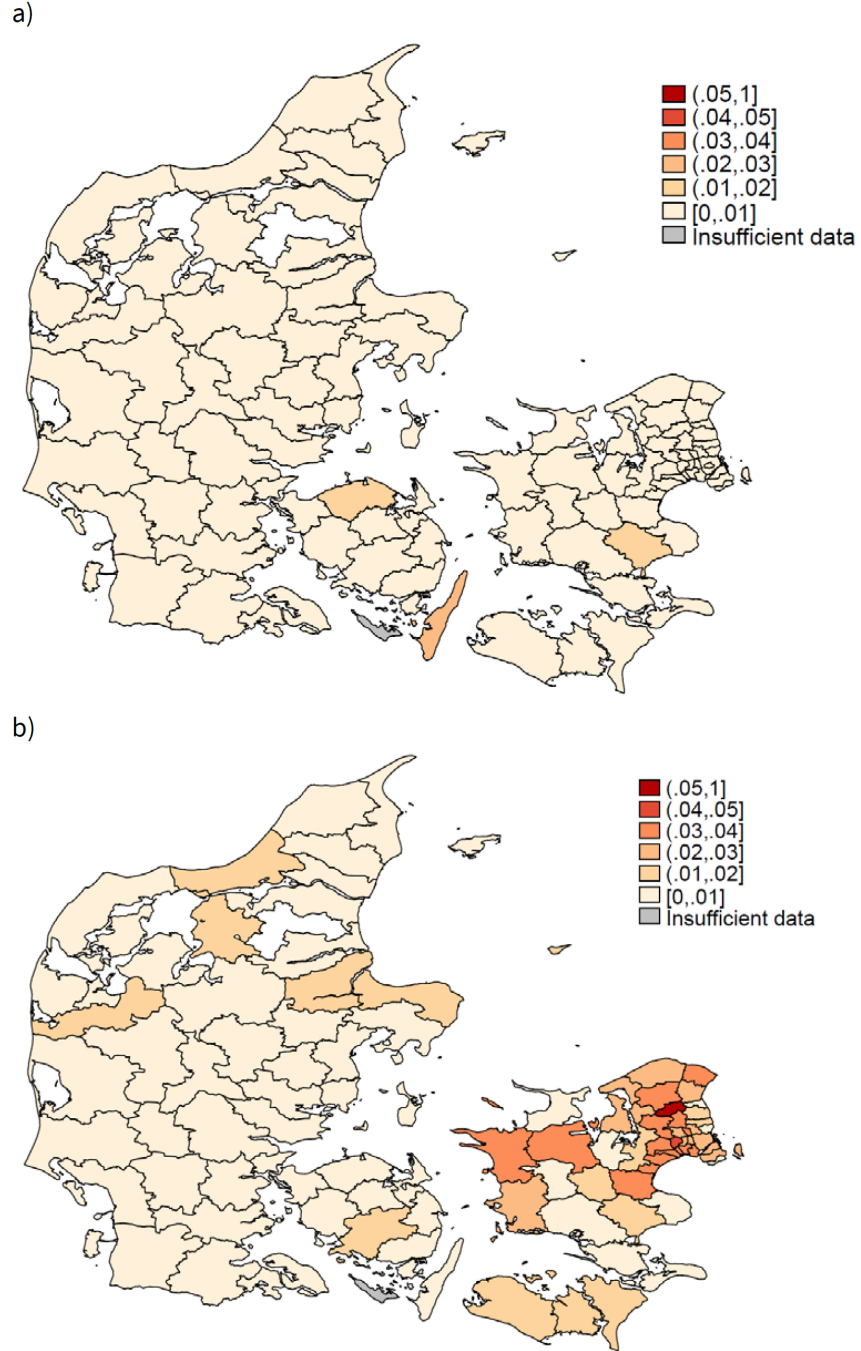
To assess the statistical significance of stricter family reunification rules in Denmark on migration to Sweden we estimate a difference-in-differences type of model. We focus on Danish citizens with immigrant background based on our insights from Figure 4. We estimate the following model:

$$EM_{it} = \beta_0 + \beta_1 D_{it} + \beta_2 T_t + \gamma(D_{it} * T_t) + u_{it} \qquad (1)$$

15

The dependent variable EM_{it} in Equation 1 is set to one if an individual i emigrates to Sweden in a given year t and set to zero if a person stays in Denmark. D_{it} is an indicator set to one if individual i belongs to the treatment group in year t and equal to zero for individuals in the control group in t. T_t is a vector of time fixed effects. Our coefficient of interest is γ, i.e. the interaction between treatment status with the period dummies. The model is estimated for Danish citizens with immigrant background in the treatment and control group. We estimate the model on repeated cross-section data with OLS and cluster standard errors at the individual level to account for serial autocorrelation in the error term.[18]

Figure 6 presents coefficient plots for the interaction effect for γ (reference category: $t = 2001$, $D = 0$) in equation 1. The estimates in Figure 6 confirm our findings from Figure 4. We plot the coefficients of the interaction term for all citizens with immigrant background in the treatment and control group (Panel A), for Zealand residents only (Panel B) and for residents from the remaining Danish regions (Panel C). In the years before 2002 the coefficient estimates do not provide any evidence for a statistically significant difference in the likelihood to migrate from Denmark to Sweden between individuals in the treatment and control group. After 2002 the estimation shows a statistically significant increase of the likelihood to emigrate for treated individuals. According to the estimates the probability to emigrate to Sweden increases by up to 1.3 percentage points after the reform. This increase is large compared to average pre-reform migration rates to Sweden in the analyzed population: the average emigration rate between 1995 and 2001 to Sweden is 0.2%.[19]
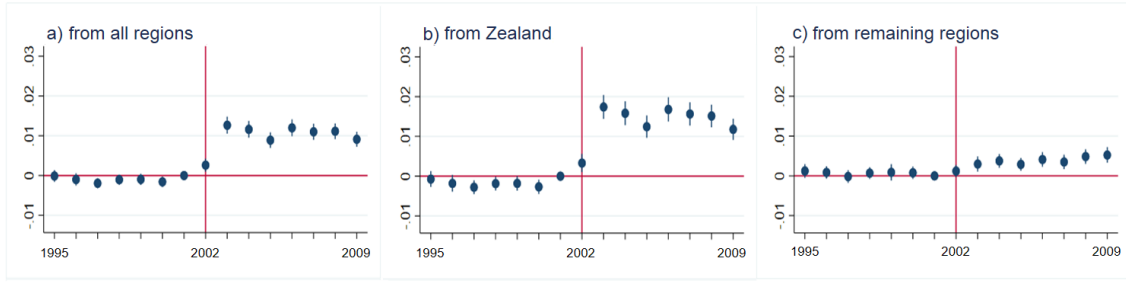
Figure 6 also plots coefficient estimates separately for the sample of residents living in Zealand, the most densely populated island in Denmark and located closest to the Skåne region in Sweden (Panel B and C). Estimates confirm the patterns depicted in Figure 5. The increase in the likelihood to emigrate to Sweden is stronger for the sample of Zealand residents. For treated individuals in the remaining regions estimated post-reform coefficients for the interaction term are much smaller.

Further, Figures B.6 and B.7 in the Appendix show that the reform response is almost entirely driven by those individuals who are below the age of 29.

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[18]We estimate the model in a robustness analysis including dummies for age, gender and children in the household as additional control variables. The results are presented in Table B.2 and Figure B.5 and are similar to those without additional control variables.

[19]In addition to the estimation results for emigration to Sweden, we also show results for emigration to all destination countries in the Appendix. In Figure B.4 we present coefficient plots for out-migration rates of treatment and control group to all countries (corresponding to our descriptive analysis in Figure 3). We also estimated the regressions corresponding to panels A), B) and C) in Figure 6 for emigration from Denmark to Germany (Figure B.9); the effect of the reform on emigration to Germany seems much weaker than for emigration to Sweden; when running the regressions for emigration of those with immigrant background to Germany separately for Zealand and the remaining regions, there is no statistical significant difference between treatment and control group in none of the two specifications. This supports our arguments that Sweden is a more attractive as residence country than Germany for Danes affected by the reform.

Figure 6 – Coefficient plots for interaction effect on migration of Danish citizens with immigrant background to Sweden.

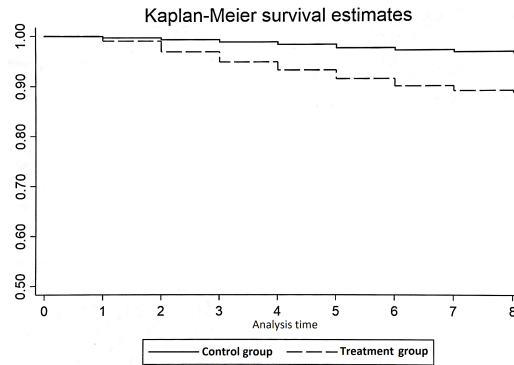*Source:* Calculations based on Danish register data.

Notes: The sample includes Danish citizens with immigrant background, older than 18 in a given year from 1995 to 2009. The treatment group are single individuals not cohabiting with a partner in a given year in Denmark. The control group are Danish citizens older than 18 years, cohabiting with a non-EU/EEA citizen in a given year in Denmark. Estimation includes a constant and dummy variables for *year* and *treatment*. The figure shows coefficient estimates for the interaction effect *treatment* x *year*. Confidence bounds show indicate statistical significance at the 5% level, standard errors being clustered at the individual level.

A potential concern when interpreting our estimates from Figure 6 as a causal effect of the policy change on treated individuals might be that individuals self-select into and out of treatment and control group based on conditions on the marriage market. For example, those individuals affected by stricter reunifications rules might be more likely to marry a Danish partner instead of a foreign citizen after 2002. To address this potential endogeneity concern we perform a duration analysis for which we present results in Figure 7. Here we consider individuals in the treatment or the control group who have immigrant background and are between 18 and 29 years old in 2001.[20] We assign these individuals to treatment and control in 2001 and follow them over the subsequent years until 2009 (without any change in treatment status). A description and average characteristics of the data used for this analysis can be found in Appendix Table B.3. Figure 7 plots Kaplan-Meier survival estimates for out-migration of treated and untreated individuals to Sweden. We observe that individuals in the treatment group have a much higher likelihood to leave Denmark in the following years than those assigned to the control group.[21] Among those with immigrant background only 3.6% of the untreated cohort but 12.1% of the treated cohort had left Denmark for Sweden in 2009. This result confirms our findings from Figure 6 and alleviates potential endogeneity concerns. Results from both analyses provide evidence for a causal effect of the Danish policy reform: individuals with immigrant background in the treatment group respond to stricter family reunification rules by emigrating, in particular to Sweden as an attractive alternative residence country. Estimates show that this response is both statistically and economically significant.

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[20]We observed the strongest change in emigration rates after the reform for young individuals with immigrant background according to Appendix Tables B.6 and B.7. When conducting the duration analysis without the upper age restriction the results are qualitatively similar.

[21]We also perform this analysis for emigration from Denmark to all destination countries in Appendix Figure B.10. These results also show a clear difference between survival function estimates of treated and untreated individuals.

Figure 7 – Kaplan-Meier estimates for emigration from Denmark to Sweden.

Kaplan-Meier survival estimates

Source: Calculations based on Danish register data.

Notes: The treatment group are Danish citizens between 18 and 29 years old in 2001, not cohabiting with a partner in that year. The control group are Danish citizens between 18 and 29 years old in 2001, cohabiting with a non-EU/EEA citizen in 2001 in Denmark. Only individuals with immigrant background included. Individuals are excluded from the analysis if they drop out of the sample during the analysis period until 2009 and are not registered as emigrants.

4 How did the Danish reform affect immigration to Sweden?

After having demonstrated that the Danish reform lead to an increase in emigration, and that most of the emigrants moved to Sweden, we turn to Sweden. First, we describe the data used in the analysis and how we identify the couples that came to reunite in Sweden as a consequence of the reform. Second, we confirm the findings based on Danish data, i.e. that the reform caused an inflow of migrants to Sweden. We also check the robustness of our results. Third, we demonstrate that many of the affected individuals left Sweden after a relatively short period of stay, with the majority leaving for Denmark.

4.1 Swedish register data

To analyze the effect of the Danish reform on reunification-related migration to Sweden we use the database GeoSweden, which contains register data from Statistics Sweden covering the full population between 1995-2014. The data set combines information from several different administrative registers and include information on country of birth, date of immigration/emigration, from (to) which country the individual immigrated (emigrated), reason for residence (including family ties permits), municipality of residence in Sweden, labor income from Sweden (and Denmark), and a number of individual characteristics, such as age, gender, marital status, children and education, among other things. [22]

Our population of interest includes all individuals that immigrated between 1995 and 2009 (that are either Danish-born, have moved to Sweden from Denmark, or have registered as living together with a former Danish resident in Sweden), which means that we can follow all individuals for at least five years after immigration as long as they do not out-migrate or die. We restrict the analysis to individuals who are 18 years or older at the time of immigration.

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[22]GeoSweden is compiled at Statistics Sweden and administered by the Institute for Housing and Urban Research at Uppsala University.

4.2 How do we identify couples reuniting in Sweden?

In Section 2.2 we discussed the fact that there are two legal frameworks that regulate the possibility of family reunification Sweden. Danish citizens can reunite with a partner in Sweden following Swedish rules or use rules regulated by the EU Free Movement Directive. Both of these routes to reunification presuppose Danish citizenship. In our data, however, we only have information on country of birth, thus we cannot confirm the citizenship status of those that reunite in Sweden. This is likely to be a small concern as we saw, in Section 3, it was Danish citizens that responded to the reform by emigrating. For foreign citizens in Denmark we found no effects.[23]

Since we lack information on actual citizenship, we rely on information on country of birth to identify couples that reunite in Sweden, and we focus on family reunification between couples of two types: i) couples where one partner is born in Denmark (and has moved to Sweden from Denmark or elsewhere) and the other is born in a non-EU country and immigrated from there, and ii) couples where both partners are born in a non-EU country with at most one of them migrating from Denmark.[24] [25] Thus, we combine information on current household status (i.e. whether the migrant is married and lives together with the spouse or cohabits with a partner with common children), country of arrival, and the country of birth to identify the affected couples.

Table 2 – Definition of affected couples

| | Affected | | Not affected | |
| | Non-EU couples | DK-non-EU couples | Non-EU couples | DK-non-EU couples |
Restrictions				
Both arrive from DK			✓	✓
Only one arrives from DK	✓	✓		
Neither arrives from DK		✓		

In contrast, we consider couples where *both* partners immigrate from Denmark to Sweden as couples who migrate to Sweden for reasons *unrelated* to the possibility of family reunification. That is, since both partners moved to Sweden from Denmark it is unlikely that they encountered problems with respect to permission to stay on marriage grounds in Denmark.[26] These couples are used as one of the control groups in the analysis that follows below. Table 2 visually summarizes our definition. In Appendix C we explain in more detail how we identify the affected couples in our data.

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[23]However, if some individuals belonging to the latter group are able to move to Sweden they can reunite with a partner following the EU directive on family reunification. For more details see Section 2.

[24]In our sample there are only 274 individuals belonging to Danish-non-EU couples where neither partner arrives from Denmark. Cf. Table 3.

[25]Since EU citizens residing in Denmark are not affected by the reform (see Section 2.1) we assign each individual EU/non-EU status based on their country of birth, combined with information on year of accession to the EU, when applicable.

[26]We consider non-EU couples where neither partner arrives from Denmark as neither affected, nor unaffected, as we cannot distinguish whether they actively choose Sweden as their destination country or whether they are pulled to Sweden because Denmark is not an option anymore.

4.3   Description of the couples reuniting in Sweden

Table 3 shows the characteristics of the affected by the Danish reform and the comparison group. Several things can be noted with regards to the affected group. First, the number of individuals reuniting in Sweden in the pre-reform period was very small. After the reform the number rises sharply for the affected group. We also observe some increase in the number of arrivals of the unaffected group, which we are going to discuss in more detail in the following subsection. Second, the mean age of the partners reuniting in Sweden after the reform is lower than before the reform. This is in line with the new age requirement that was part of the reform, according to which both partners must be at least 24 years old to be able to reunite in Denmark (see Section 2). Third, the partners arriving after the reform are less likely to have children. Fourth, we observe that a higher share of the partners arriving from Denmark were born there while very few of the partners arriving from elsewhere were born in Denmark after the reform. Fifth, after 2002, a significantly higher proportion of the partners arriving from Denmark after the reform have labor income from Denmark after the move to Sweden (cross-border commuting in the border region is possible).

In Section 2.2 we discussed the hypothesis that it is likely that geographic closeness matters for migration decisions, an hypothesis that is supported by the fact that migrants from Zealand (the most eastern region in Denmark) are overrepresented among those that left Denmark due to the reform. Similarly, if distance matters we would expect to see a higher share of the couples that reunited in Sweden as a consequence of the reform to settle in Skåne (the most southern region in Sweden) in comparison with more remote regions. The upper panel in Figure 8 represents the southern half of Sweden and it shows the geographic locations of reunified partners. The majority of partners in reunified couples settle in Skåne after the reform (over 90% of the partners). The map in the lower-panel of Figure 8, which zooms in on the county of Skåne, shows that within Skåne, the most popular destinations are Malmö, Landskrona and Helsingborg on the western coast of Skåne. The pattern observed in Figure 8 hence indicates that Sweden is a viable alternative for those that want to relocate following the 2002 reform in Denmark and that the affected individuals actually reacted on the stricter rules imposed in 2002.

Table 3 – Descriptive statistics

| | Arrival 1995-2001 | | | | Arrival 2002-2009 | | | |
	All	Affected From Denmark	From elsewhere	Unaffected	All	Affected From Denmark	From elsewhere	Unaffected
Age	36.68	35.60	37.09	37.04	27.76	28.36	27.20	34.88
Female	48.78	26.67	57.14	50.00	50.04	45.79	53.97	50.00
Any children	52.44	40.00	57.14	69.57	28.45	27.29	29.53	59.90
Education								
Compulsory education or less	6.10	11.11	4.20	10.51	7.75	7.27	8.19	7.36
Secondary education 3 years or less	11.59	11.11	11.76	9.06	11.32	12.21	10.50	11.04
Post-secondary education	18.90	20.00	18.49	15.22	20.80	21.77	19.90	29.95
Post-graduate education	4.88	4.44	5.04	2.54	0.53	0.45	0.60	1.21
Missing education	58.54	53.33	60.50	62.68	59.60	58.29	60.80	50.44
Income from Sweden	31.71	28.89	32.77	22.10	8.63	9.31	8.01	8.31
Income from Denmark	7.32	17.78	3.36	7.25	37.77	75.74	2.68	54.06
Country of birth								
Denmark	37.80	46.70	34.50	24.30	27.90	53.90	3.90	26.90
Turkey	3.70	6.70	2.50	6.90	19.60	12.90	25.80	9.90
Pakistan	1.80	2.20	1.70	1.10	9.10	4.10	13.80	6.00
Former Yugoslavia	4.90	8.90	3.40	3.60	0.90	1.50	0.40	1.60
Bosnia	2.40	8.90	3.40	2.20	1.90	3.90	3.60	3.00
Observations	164	45	119	276	5096	2448	2648	1576

Source: Calculations based on Swedish register data.

Notes: Statistics refer to the year of reunification. Income from Sweden is defined as having positive income in Sweden. Information on income from Denmark is only available from 2001 and onward. The countries of origin (other than Denmark) that we show statistics for are the top four countries of origin for immigrants in Denmark.

Figure 8 – Geographic location of the affected group during the first year in Sweden

Panel A: Location across the southern half of Sweden
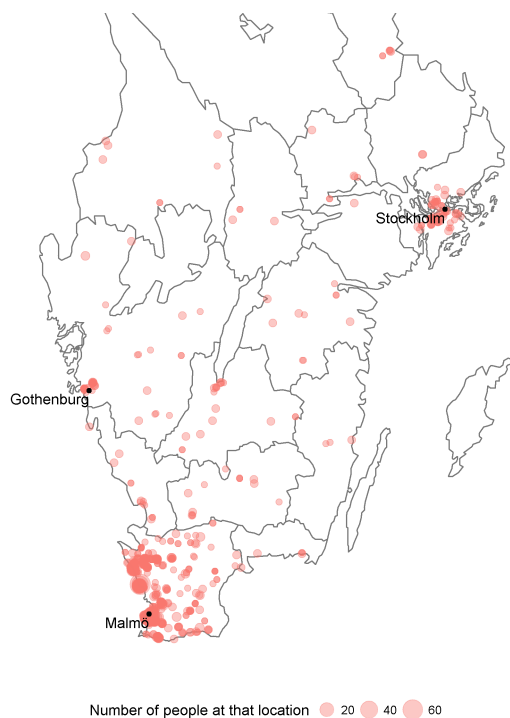
Panel B: Location across the Skåne county
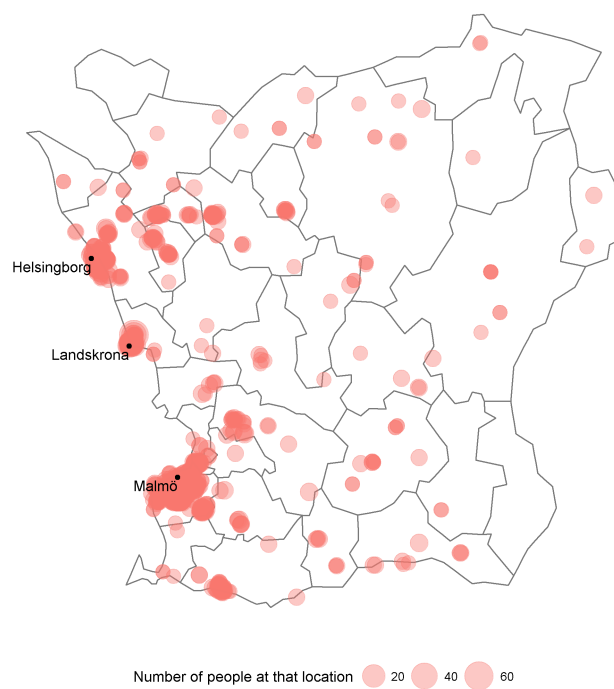
Notes: The size of each dot represents the number of individuals settling in a 100x100 area.

4.4 Effects of stricter reunification policy in Denmark on reunification-related migration to Sweden

To investigate the effects of the tougher reunification rules instigated in the first half of 2002 in Denmark, on reunification-related migration to Sweden, we conduct an Interrupted Time Series Analysis (ITSA).[27] To that end, we estimate the following model:

$$IM_t = \beta_0 + \beta_1 T_t + \beta_2 D_t + \beta_3 D_t \times T_t + \varepsilon_t \tag{2}$$

where IM_t is the number of immigrants (defined as the group of individuals affected by the 2002 reform in Denmark) to Sweden in time period t, T_t is the time in period t since the first time point in the data, D_t is a dummy taking the value 1 for post-reform years and the value 0 for pre-reform years, and $D_t \times T_t$ is the interaction term. To account for autocorrelation and heteroscedasticity, we estimate Newey-West standard errors with one lag. We run the analysis at a half-year frequency, with the reform taking place in the first half of 2002 (since the policy was announced in January of 2002).[28]

The coefficients obtained when estimating equation (2) are plotted in Figure 9a; β_0 gives the initial immigration level, β_1 the slope of the immigration variable in the pre-reform period, β_2 the change in level when the reform was implemented in 2002 (implying that β_2 can be interpreted as the immediate treatment effect), and β_3 the difference between pre- and post-reform trends (implying that β_3 can be interpreted as the treatment effect over time).

There are three things that can be noted from the figure. First, as was apparent from the summary statistics in Table 3, very few affected individuals migrated to Sweden to form a couple before the reform was instigated in 2002. Second, there is a sharp increase in the number of affected in-migrants after 2002; between 2003 and 2009 there are approximately 300 to 350 individuals that migrated to Sweden to form a couple every half-year. Since the reform was decided on in the beginning of 2002 and instigated on the first of July the same year, we can notice a jump already in 2002. Third, β_2 turns out highly significant, while β_3 is significant at the 10% level (see left column in Table D.1 in the appendix).[29]

A concern one might have with the ITSA-specification in equation (2) is the potential interfering effects from the opening of the Öresund Bridge in July 2000.[30] Since the Öresund Bridge offers an easy and fast connection between Copenhagen in Denmark and Malmö in Sweden, and since it is cheaper to live on the Swedish side than on the Danish side, an increase in immigration from Denmark to Sweden as an effect of the bridge could

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[27]Interrupted time series analysis is a quasi-experimental research design that has the potential to provide good internal validity, especially when applied to both a treatment and a control group (see, e.g., Campbell and Stanley 1966 and Shadish et al. 2002 for a discussion on this). According to Shadish et al. (2002), "[b]oth interrupted time series and regression discontinuity often yield excellent effect estimates". See also Linden et al. (2015) for an implementation of ITSA in Stata and for further discussion and references.

[28]We have also done the analysis with the reform taking place in the second half of 2002, when the policy was officially implemented; this does not alter our conclusions. The results are available on request.

[29]All the results from the ITSA-estimations can be found in the Appendix.

[30]More generally, the concern is that there might be some interfering effects from some other events happening close in time to the year 2002 that might affect immigration to Sweden. For our specific case, we know of no other such threat than the new bridge.

be expected. However, Figure 9a indicates no increase in immigration of the group of individuals affected by the 2002 reform before 2002. When conducting the ITSA-analysis with two interventions, one in 2000 and one in 2002, it is also clear that there is no change in the in-migration rate in 2000 (see Figure 9b)

Figure 9 – Stricter reunification rules in Denmark and immigration to Sweden
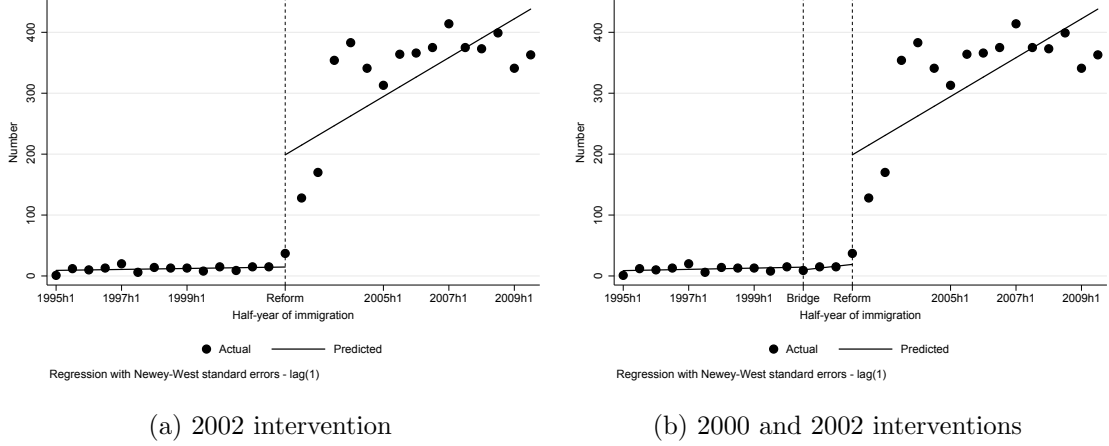
(a) 2002 intervention (b) 2000 and 2002 interventions

Source: Calculations based on Swedish register data.

Notes: The figure displays the regression results based on equation (2). The model is estimated using "Interrupted time series analysis" and Newey-West standard errors with one lag are used. Regression estimates are found in Table A.3 in the Appendix. Individuals belonging to following type of couples, that we consider treated, are included in the sample: i) couples where one partner is born in Denmark (and has moved to Sweden from Denmark) and the other in a non-EU country, and ii) couples where both partners are born in a non-EU country with at most one of them migrating from Denmark.
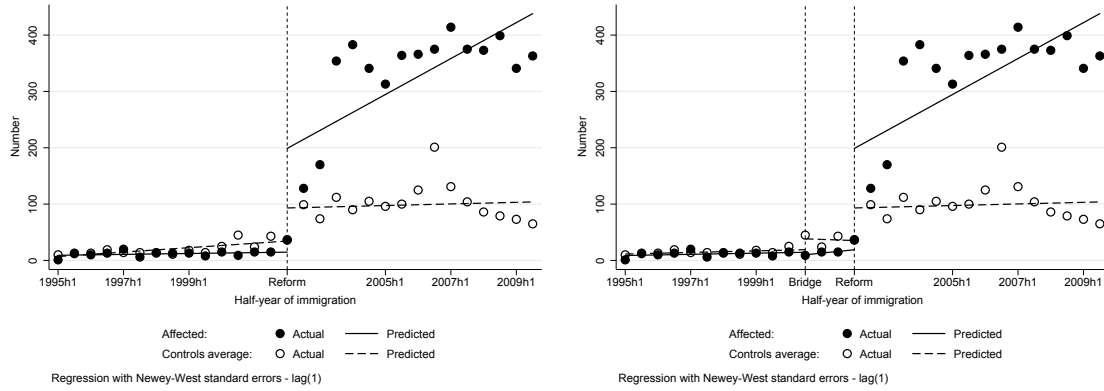
Another concern one might have is the possibility that something else happens in Denmark in 2002 (another reform or change) that explains the increased immigration to Sweden in that year. To examine this, we combine the ITSA-analysis in equation (2) with a control group approach:

$$IM_t = \beta_0 + \beta_1 T_t + \beta_2 D_t + \beta_3 D_t \times T_t + \beta_4 TREAT_t + \beta_5 TREAT_t \times T_t +$$
$$\beta_6 TREAT_t \times D_t + \beta_7 TREAT_t \times T_t \times D_t + \varepsilon_t \qquad (3)$$

where $TREAT_t$ is a dummy-variable assigning individuals into treatment and control groups (taking the value 1 for those affected by the 2002 reform in Denmark and 0 for those unaffected; c.f. Table 2 for definitions of affected and unaffected). Coefficients $\beta_4 - \beta_7$ hence refer to the treatment group and coefficients $\beta_0 - \beta_3$ to the control group. Estimating equation (3) gives the results presented in Figure 10a (the dotted lines are for the control group and the solid lines for the treatment group). As is clear from the figure, the unaffected group follows a very different time pattern, with a gradual increase in the number of immigrants of this type from year 2000 and onwards, indicating that the individuals unaffected by the 2002 family reunification reform rather started to react on the opening of the Öresund Bridge. This is made clear from an estimation of the ITSA-specification in equation 3 augmented with an intervention in 2000 as well (c.f. Figure

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10b; while the treatment group does not react on the opening of the bridge in 2000, there is a small, discrete jump for the unaffected group in that year.[31] From the analysis on the Danish data when using half-year frequencies, it is clear that the big effect on out-migration to Sweden takes place in the second half of 2003/first half of 2004. This is likely the explanation for the "additional" discrete jumps observed in these time periods in Figures 9 and 10. When adding an additional "intervention" in the second half of 2003, the yearly effect of the reform in Denmark on out-migration to Sweden in the longer run is clearly visible (c.f. Figure D.1 in the Appendix).

Figure 10 – Stricter reunification rules in Denmark and immigration to Sweden: Adding a Danish control group

(a) 2002 intervention   (b) 2000 and 2002 interventions

Source: Calculations based on Swedish register data.

Notes: The figure graphically displays the regression results based on equation (3). The model is estimated using "Interupted time series analysis" and Newey-West standard errors with one lag are used. Regression estimates are found in Table A.4 in the Appendix. Individuals belonging to following type of couples are considered treated: i) couples where one partner is born in Denmark (and has moved to Sweden from Denmark) and the other in a non-EU country, and ii) couples where both partners are born in a non-EU country with at most one of them migrating from Denmark.The control group consists of couples where *both* partners immigrate from Denmark to Sweden as couples who migrate to Sweden for reasons *unrelated* to the possibility of family reunification.

A final concern with the ITSA-specification in equation (2) is that there might be something else happening in 2002 in Sweden, e.g. a reform making Sweden a particularly attractive country for migrant couples, that could explain the increased immigration to Sweden from 2002 and onwards. To examine the relevance of this worry, we once again adopt a control group approach and compare the migration pattern of individuals affected by the immigration reform in Denmark with the migration pattern of the same type of individuals from the other two neighboring countries to Sweden (Norway and Finland). That is, we rerun equation (3), but let immigrants from Finland and Norway constitute the control group instead of the unaffected individuals from Denmark.[32]

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[31]We consider the time pattern after year 2000 for the unaffected group to be mainly a function of the opening of the bridge in that year. However, since the group of unaffected couples consists of at least one foreign-born individual, we cannot rule out that part of the discrete increase in 2002 for the group unaffected by the stricter reunification rules to be a result of increased general discontent with the tougher immigration policies instigated in Denmark in that year (compare also with the results in Table D.2 in the Appendix).

[32]An important assumption here is that there were no major changes in the family reunification policies

The results, presented in Figure 11, strongly suggest that there are no other things happening around 2002 that can explain the results; while immigration from Denmark sharply increases after 2002, immigration from Finland and Norway remains constant at very low levels.

Figure 11 – Stricter reunification rules in Denmark and immigration to Sweden: Comparing with immigration from Finland and Norway
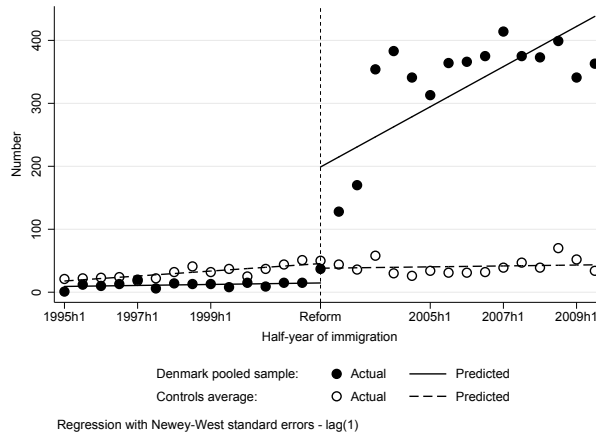
Source: Calculations based on Swedish register data.

Notes: The figure graphically displays the regression results based on equation (3). The model is estimated using "Interrupted time series analysis" and Newey-West standard errors with one lag are used. Regression estimates are found in Table A.4 in the Appendix. Individuals belonging to following type of couples are considered treated: i) couples where one partner is born in Denmark (and has moved to Sweden from Denmark) and the other in a non-EU country, and ii) couples where both partners are born in a non-EU country with at most one of them migrating from Denmark. The control group consists of the same type of individuals belonging to couples but with a connection to Norway or Finland.

The patterns observed in Figures 9–11 indicate that the increased reunification-related migration to Sweden would not have happened in the absence of the stricter reunification rules instigated in Denmark in 2002. To put the figure of approximately 350 individuals immigrating to Sweden as an effect of the Danish reform in perspective, it can be worth noting that all the increase in emigration from Denmark after 2001 seems to be related to emigration to Sweden (as revealed by our earlier analysis on Danish data).[33] The next obvious question is: Did the reunited couples stay in Sweden or did they return to Denmark?

4.5 After reunification: Is there any return-migration to Denmark?

Our results strongly indicate that the tougher immigration policies implemented in Denmark in 2002 caused part of the group affected by the reform to move to Sweden. The move to Sweden might have been either a temporary one – used to be able to reunite with

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in Norway and Finland, which is indeed the case. The same goes for the reunification policies in Sweden.

[33]These results are also in line with the two tables on pages 94-95 in Schmidt et al. (2009). Even though the analysis in Schmidt et al. (2009) does not account for the potential effects of the Öresund bridge, the potential effects of reforms taking place in Sweden at the same time, or affected individuals not residing in Denmark, and only considers a limited sample of all individuals in Denmark that could have been affected (they look at 20-year olds and 25-year olds with an ethnic minority background), their result also indicates that the figure we find for Sweden could not have been much larger (since there was no increase in emigration to the country of origin or to some other country).

a partner and then return to Denmark – or a more permanent one.

To examine what the pattern looks like, we follow partners in all couples that formed in Sweden between 2002 and 2009, and explore their migration behavior from the time the couple is formed until the last time we observe each *partner* in the registers.[34] In order to put the outcomes of interest in perspective, we will compare the migration behavior of the group affected by the reform with those of the group of couples where both partners arrive from Denmark (which served as one of our control groups in the analysis in Section 4.4).[35]
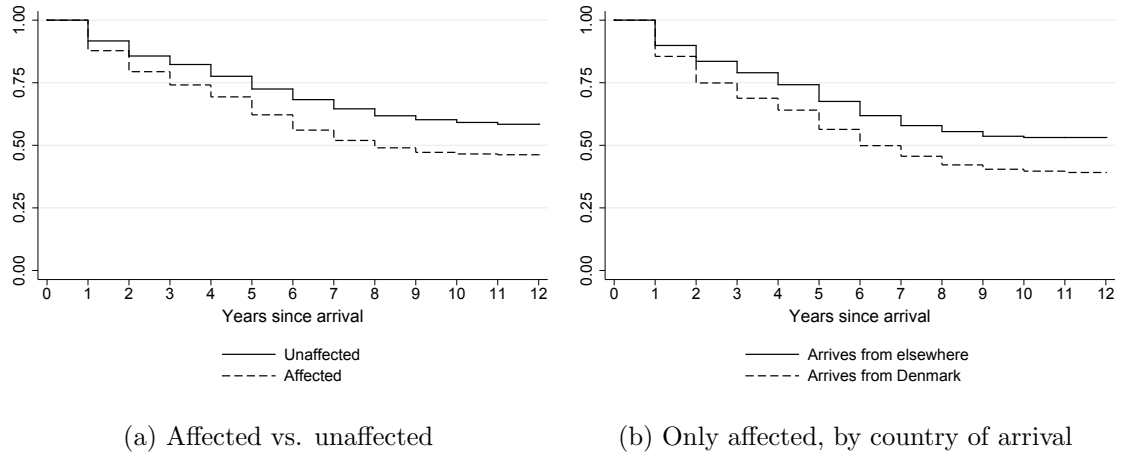
From Figure 12, which plots Kaplan-Meier survival estimates by years since immigration, for the affected and the unaffected group arriving after 2002, we can draw three main conclusions. First, as Figure 12a shows, a non-significant share of the affected group arriving in 2002 or later leaves Sweden within a few years since arrival; approximately 20 (50) percent leave within two (eight) years (c.f. the dotted line).[36] Second, when comparing with the unaffected group (dotted vs. solid line), the affected group emigrates to a larger extent in every year since arrival (with a widening gap between the two groups over time). The propensity to leave after 10 years in Sweden is around 10 percentage points higher for the affected group than for the unaffected group. Third, when focusing on the affected group only (see Figure 12b) and comparing those that have arrived from Denmark (dotted line) with those that have arrived from elsewhere (solid line), it is also clear that the former group emigrates from Sweden to a larger extent than the latter group.

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[34]That is, we follow individuals even if the couple breaks up at some point after arrival. Furthermore, we focus on how the migration spell corresponding to reunification ended for each partner. Some partners leave permanently, others temporarily and others don't leave at all. By looking only at how the reunification migration spell ends, we cannot say whether the exit is permanent or temporary.

[35]Since return or temporary migration is a widespread phenomenon, regardless of the original reason for migration (for an overview see Dustmann and Görlach, 2015), we expect mobility to be high. Earlier studies have also shown that cross-border mobility within the Nordic countries is particularly high (Edin et al., 2000, Jensen and Pedersen, 2007). Edin et al. (2000), for example, show that about 45 percent of the Nordic immigrants to Sweden leave the country within five years after arrival. It can also be noted that the motives behind the move to Sweden are likely to vary between these two groups. While it is true that the move across Öresund is a voluntary choice for both groups, the Danish reforms left little room for the affected group to reunite with a partner in Denmark. Thus, the two groups are likely to maximize different objectives when deciding on whether they should move to Sweden or not. Whether we should expect the affected couples to leave Sweden to a larger extent than the unaffected group is however difficult to say. The 2002 reforms made Denmark less welcoming to migrants in general, which might have lowered the groups' overall propensity to return to Denmark. Furthermore, the connection to Denmark is arguably weaker for the affected group than for the unaffected group (where both partners arrive from Denmark) since one of the partners in the couples that reunite in Sweden arrives from countries outside the EU.

[36]Our onward migration figures are larger than those found in Schmidt et al. (2009). This can be due to the fact that we have a control group approach and/or that we consider a longer post-reform time period.

Figure 12 – Onward migration

(a) Affected vs. unaffected   (b) Only affected, by country of arrival

Source: Calculations based on Swedish register data.

Notes: The sample includes all individuals belonging to couples that were formed in Sweden between 2002 and 2009. Panel (a) plots Kaplan-Meier survival estimates - where survival is defined as being in Sweden in 2014 or the year before death, whichever comes first - by years since immigration, for the affected and the unaffected group arriving after 2002. Panel (b) does the same but only for the affected group, by whether they arrive from Denmark or elsewhere.

But to which countries do those that leave Sweden emigrate to? Do they move to Denmark or choose a different destination? From Table 4 it is clear that the absolute majority (around 87 percent) of the individuals in the affected group that leave Sweden went to Denmark. This figure is also larger than the corresponding figure for the unaffected group (around 80 percent). When looking at the affected group, we find that as many as 95 percent of those that arrived from Denmark to Sweden go back to Denmark (given that you emigrate from Sweden). The corresponding figure is lower (77.7 percent) for those that arrived to Sweden from elsewhere.

Table 4 – Onward migration statistics

	Affected			**Unaffected**
	All	Arrives from Denmark	Arrives from elsewhere	
% leaving Sweden before 2014	53.10	59.70	46.90	42.40
Conditional on leaving				
% going to Denmark	87.10	95.00	77.70	80.10
% going to their home country	4.30	0.80	8.40	5.50
% going elsewhere	8.60	4.20	13.80	14.30
Mean no. of years in SE	2.95	2.94	2.97	3.12
(st. dev. in parentheses)	(2.45)	(2.44)	(2.46)	(2.64)
Observations	5095	2447	2648	1576

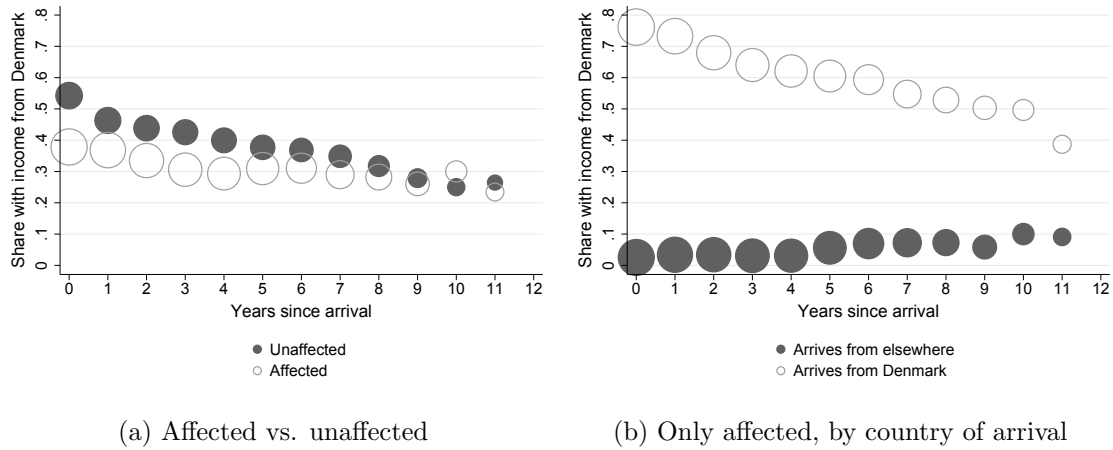*Source:* Calculations based on Swedish register data.

Notes: The sample includes all individuals belonging to couples that were formed in Sweden between 2002 and 2009.

The results in Table 4 indicate that the move to Sweden was from the beginning seen

as a temporary one, motivated by the inability to reunite with a partner in Denmark but still having Denmark as the preferred country to live in. This interpretation is also backed up by the geographical location in Sweden of the affected individuals that we presented earlier (with the majority settling in areas very close to Denmark).

That the migration decision for many individuals was a temporary one is an interpretation that is also in line with the fact that a clear majority (around 80 percent) of those in the affected group that migrated to Sweden in the wake of the Danish reform have labor earnings from Denmark during the year of arrival (see Figure 13b); over time the share falls but remains above 40 percent throughout the period of study.[37] Thus, it is evident that many of the migrants coming to Sweden as a consequence of the reform remain employed in Denmark.

Figure 13 – Earnings from Denmark

(a) Affected vs. unaffected   (b) Only affected, by country of arrival

Source: Calculations based on Swedish register data.

Notes: The sample includes all individuals belonging to couples that were formed in Sweden between 2002 and 2009. The information for income from Denmark is missing for 2014. In both figures, each circle radius is equal to the square root of the number of observations in each group, for each year since arrival.

5 Conclusions

In this paper we address two questions. First, we examine if and to what extent tougher immigration policies in one EU country cause individuals to move to a neighboring country (i.e., if there are spillover effects of a country's immigration policies). Second, we explore whether those that leave because of tougher policies do so indefinitely or return at a later stage. To answer these questions, we estimate the effect of a 2002 immigration policy reform in Denmark that made it much harder for families to reunite in Denmark. The new rules made it impossible for Danish residents under the age of 24, and very hard for those above 24, to reunite with partners from outside the EU.

Starting with the first question, we find strong evidence in support of the reform causing an increase in emigration from Denmark using Danish register data. After 2002 our results show a statistically significant increase of the likelihood to emigrate for those

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[37]In the Swedish register data we can observe whether an individual has work-related earnings from Denmark.

affected by the reform. Our analysis shows that Sweden absorbed the absolute majority of those potentially affected by the Danish reform.[38] We also show that the increase in the likelihood to emigrate (to Sweden) is stronger for the Danish residents residing on Zealand, the Danish region located most closely to Sweden.

Using interrupted time series analysis on Swedish register data, we confirm the findings based on Danish data. We find a clear and significant effect of the reform in Denmark on reunification-related migration to Sweden. While that type of migration was almost non-existent before the reform, approximately 350 individuals migrated to Sweden every six months after the reform to form a partnership with a non-EU partner.

One explanation of the magnitude of the effect, that we have already touched upon, might be the geographic closeness and easy access to the most southern part of Sweden from Zealand on which most individuals affected by the reform live.[39] Examining the location pattern in Sweden of the affected immigrants, we find that, to a very large extent, they locate in the southern-most region in Sweden (and then mainly in the cities with very good ferry- and bridge-connection with Zealand; Malmö and Helsingborg).

With the use of Swedish data we can also rule out alternative explanations to the strong immigration flow to Sweden following the reform. E.g., we can rule out that the opening of the Öresund bridge, that connects Copenhagen (the capital of Denmark) with Malmö (the third city of Sweden), just two years before the reform can explain the inflow, or that there is something else happening in Sweden, e.g. a reform that made Sweden particularly attractive for migrant couples, around the years of the reform.

Regarding the second question, whether those that migrated to Sweden as an effect of the reform in Denmark stayed on in Sweden or not, our results show that a non-trivial fraction of those affected by the Danish reform seem to have considered the move to Sweden as a temporary one; already after two years approximately 20 percent out-migrate from Sweden and after eight years the corresponding figure is approximately 50 percent. The out-migration rate is significantly higher for the affected group than for a similar but unaffected group. In addition, the absolute majority of those that out-migrate after forming a couple in Sweden go back to Denmark, indicating that Denmark was their preferred choice of location (also after the move).

The results in this paper suggest that spillover effects of national migration policies can be substantial and should be considered when shaping new, country-specific, immigration policies. An important task for future research is to examine whether this type of spillover effects affect the policy-setting behavior of neighboring countries. In this respect, the paper is related to the literature on strategic interactions among different regions (countries, states, etc.) in the determination of fiscal policies (see e.g. Brueckner (2000) and Dahlberg and Edmark (2008)). If political decision-makers believe that generous rules for family reunification attract immigrants, and if it is assumed that nobody wants to be the most generous jurisdiction in the region, a "race-to-the-bottom" in the setting of migration policies levels is likely to materialize. Evidence on this, in combination with the evidence

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[38]This is also indicated by the figures presented in Schmidt et al. (2009).

[39]Schmidt et al. (2009) also find that most of the emigration from Denmark to Sweden in the group they study takes place from the Copenhagen area.

found in this paper, constitute important input to the active debate within the EU on whether immigration policies should be set at the European or at the national level.

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Appendices

A Danish register data and sample selection

For our analysis regarding emigration of Danish residents we use Danish administrative data for the years 1995 to 2009 from the population and migration registers held by Statistics Denmark. The population register contains information on gender, age, municipality of residence, migration background, citizenship and country of origin for each resident being registered in Denmark in a given year. The data also provides information on family status of an individual such as whether the person has a married/registered/cohabiting partner as well as the number and age of children living in the household. The migration register contains all registered in- and out-migration events including date and country of origin/destination. Registering emigration is compulsory for Danish residents if leaving the country for more than six months.

Concerning the migration data we consider in our analysis all emigration events to any country except Faroe Islands or Greenland as these are autonomous Danish overseas territories. We do not impose any restriction on the length of the migration spell; if an individual emigrates more than once in a given year we only consider the latest emigration event in that year. We merge the migration and the population data for each of the considered cross-section years using an anonymized identifier based on each resident's social security number. For residents living with or married to a partner in Denmark we also merge information on the partner's age, country of origin and citizenship. In our final data set we keep only individuals that are registered as residents in Denmark in a given year and that either emigrate to a foreign country (except Faroe Islands or Greenland) or do not emigrate in a given year and show up in the register data in the subsequent year.

# B Additional empirical results on emigration from Denmark

Figure B.1 – Half-yearly emigration rates of treatment and control group to Sweden. a) all, b) immigrant background, c) immigrant background, 4 most frequent countries of origin.
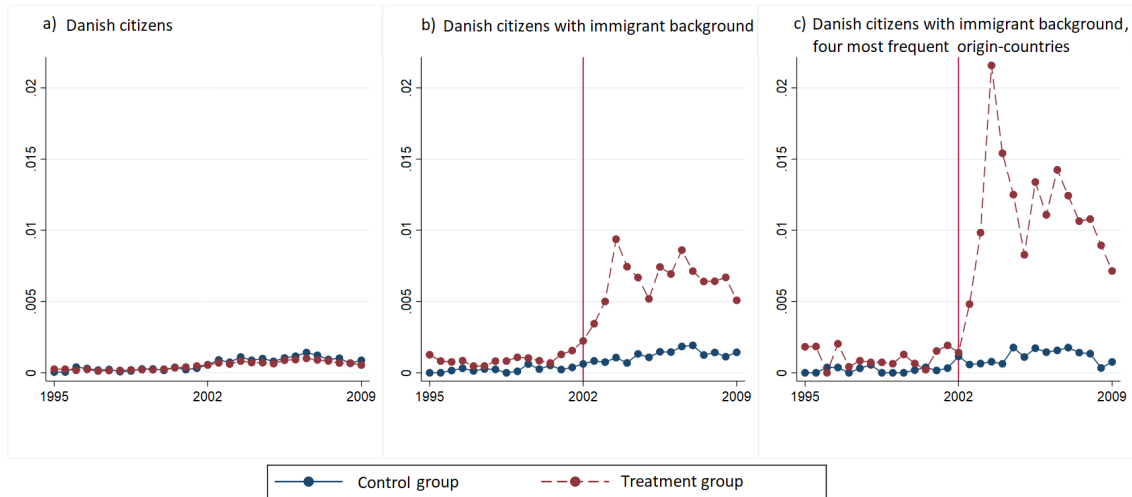
Source: Danish register data.

Notes: The treatment group are Danish citizens older than 18 years, not cohabiting with a partner in a given year in Denmark. The control group are Danish citizens older than 18 years, cohabiting with a non-EU/EEA citizen in a given year in Denmark.

Figure B.2 – Yearly emigration rates of treatment and control group to Germany.
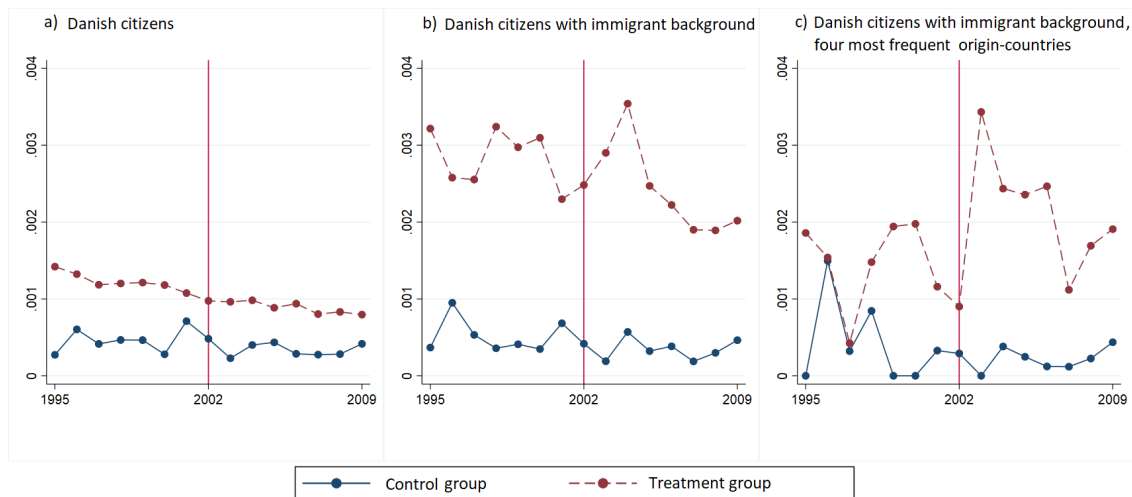
Source: Danish register data.

Notes: The treatment group are Danish citizens older than 18 years, not cohabiting with a partner in a given year in Denmark. The control group are Danish citizens older than 18 years, cohabiting with a non-EU/EEA citizen in a given year in Denmark.

Figure B.3 – Number of emigrants with immigrant background in treatment group to Germany and Sweden.

Notes: The treatment group are Danish citizens older than 18 years, not cohabiting with a partner in a given year in Denmark. The control group are Danish citizens older than 18 years, cohabiting with a non-EU/EEA citizen in a given year in Denmark.
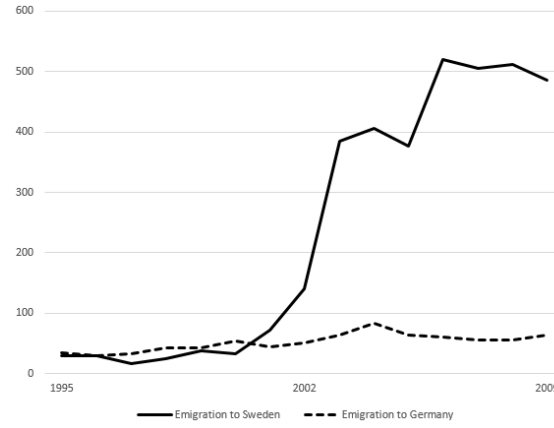
Figure B.4 – Coefficient plots for interaction effect on emigration of Danish citizens with immigrant background to all destinations.

Notes: The sample includes Danish citizens with immigrant background, older than 18 in a given year from 1995 to 2009. The treatment group are single individuals not cohabiting with a partner in a given year in Denmark. The control group are Danish citizens older than 18 years, cohabiting with a non-EU/EEA 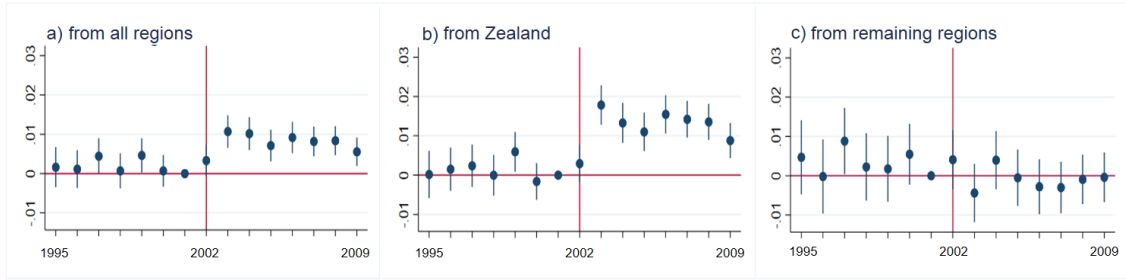citizen in a given year in Denmark. Estimation includes a constant and dummy variables for *year* and *treatment*. The figure shows coefficient estimates for the interaction effect *treatment* x *year*. Confidence bounds show indicate statistical significance at the 5% level, standard errors being clustered at the individual level.

Figure B.5 – Coefficient plots for interaction effect on migration for Danish citizens with immigrant background. Regressions with additional control variables.

Notes: The sample includes Danish citizens with immigrant background, older than 18 in a given year from 1995 to 2009. The treatment group are single individuals not cohabiting with a partner in a given year in Denmark. The control group are Danish citizens older than 18 years, cohabiting with a non-EU/EE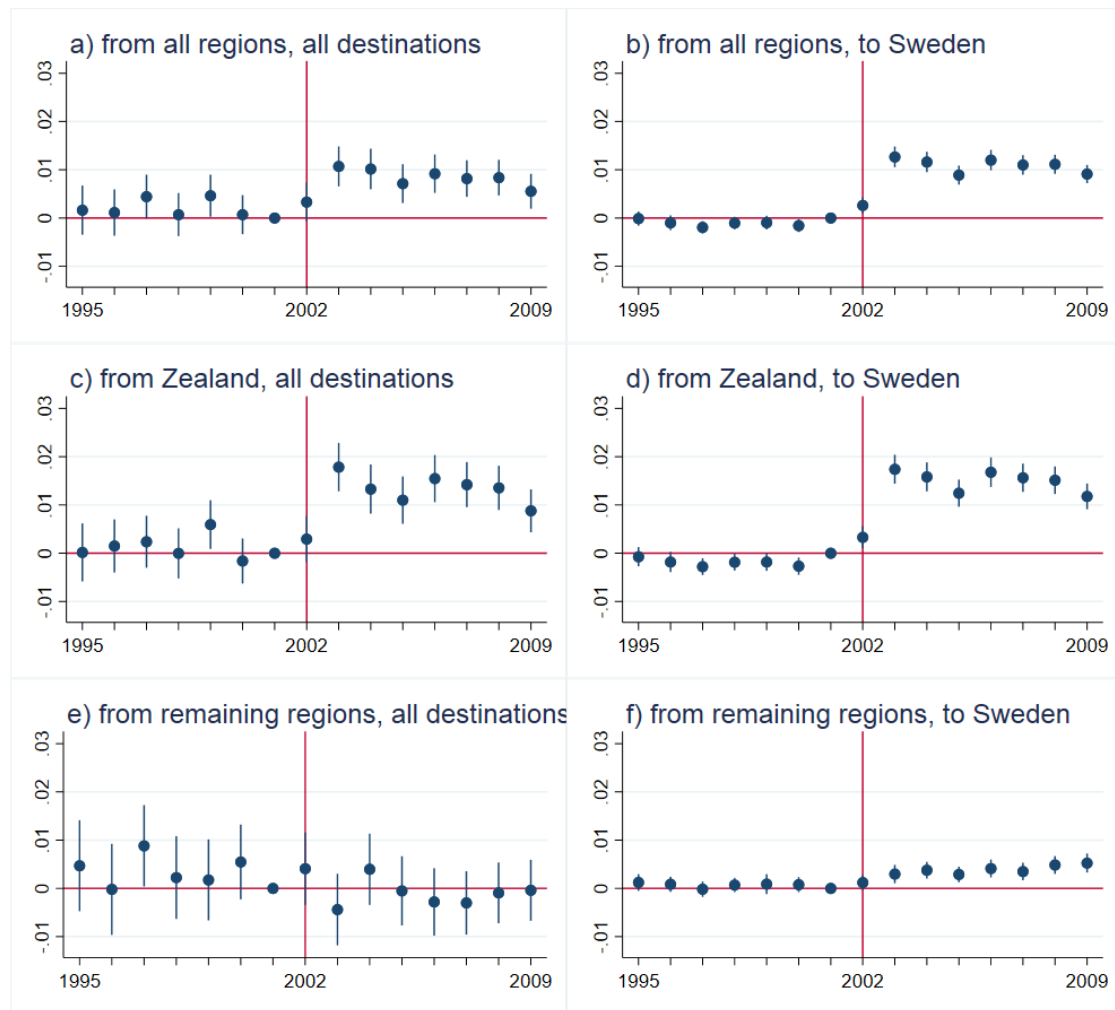A citizen in a given year in Denmark. Estimation includes a constant and dummy variables for *year*, *treatment*, *year* x *treatment*, *age*, *female*, *children*. The figure shows coefficient estimates for the interaction effect *treatment* x *year*. Confidence bounds show indicate statistical significance at the 5% level, standard errors being clustered at the individual level.

Figure B.6 – Coefficient plots for interaction effect on migration for Danish citizens younger than 29 with immigrant background.

Notes: The sample includes Danish citizens with immigrant background, older than 18 and younger than 29 in a given year from 1995 to 2009. The treatment group are single individuals not cohabiting with a partner in a given year in Denmark. The control group are Danish citizens older than 18 years, cohabiting with a non-EU/EEA citizen in a given year in Denmark. Estimation includes a constant and dummy variables for *year* and *treatment*. The figure shows coefficient estimates for the interaction effect *treatment* x *year*. Confidence bounds show indicate statistical significance at the 5% level, standard errors being clustered at the individual level.

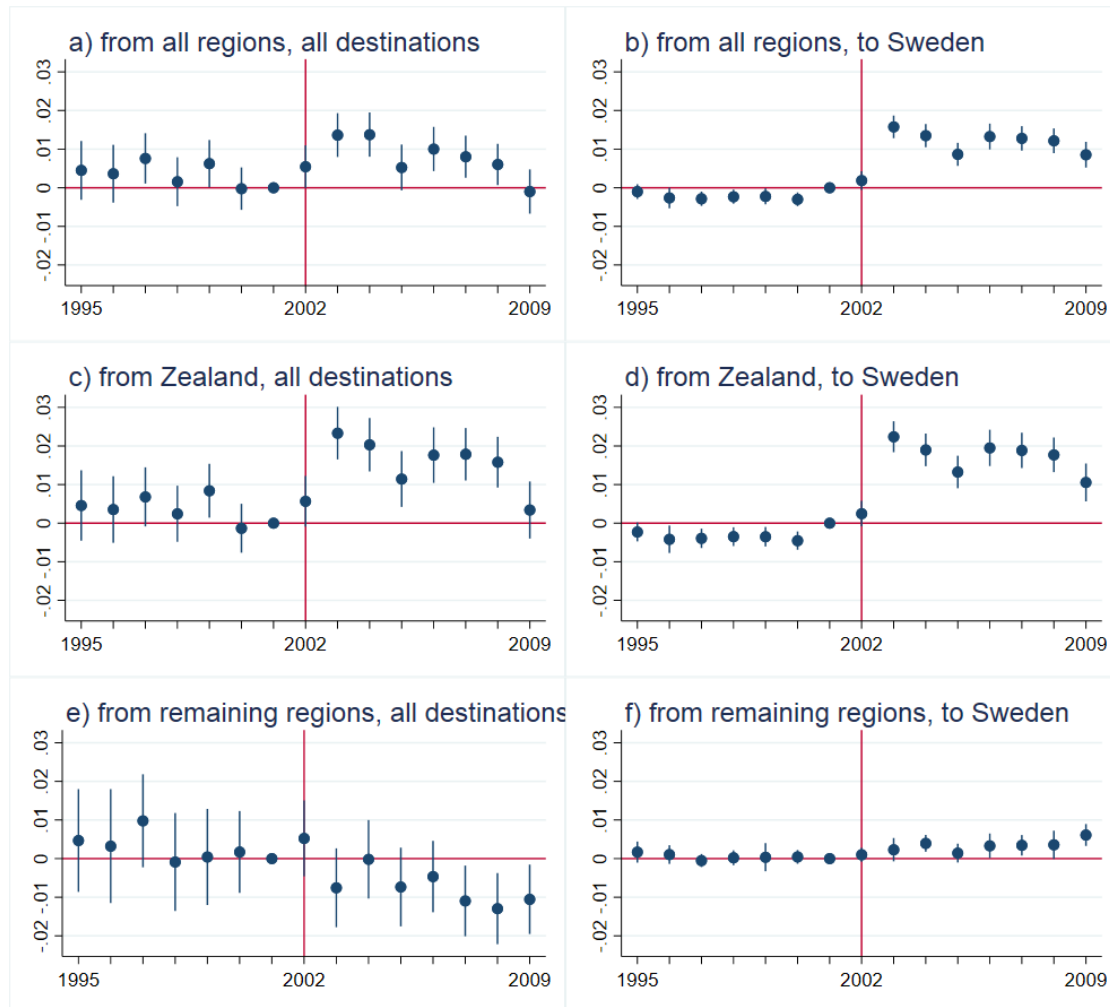Figure B.7 – Coefficient plots for interaction effect on migration for Danish citizens aged 29 or older with immigrant background.

Notes: The sample includes Danish citizens with immigrant background, aged 29 or older in a given year from 1995 to 2009. The treatment group are single individuals not cohabiting with a partner in a given year in Denmark. The control group are Danish citizens older than 18 years, cohabiting with a non-EU/EEA citizen in a given year in Denmark. Estimation includes a constant and dummy variables for *year* and *treatment*. The figure shows coefficient estimates for the interaction effect *treatment* x *year*. Confidence bounds show indicate statistical significance at the 5% level, standard errors being clustered at the individual level.
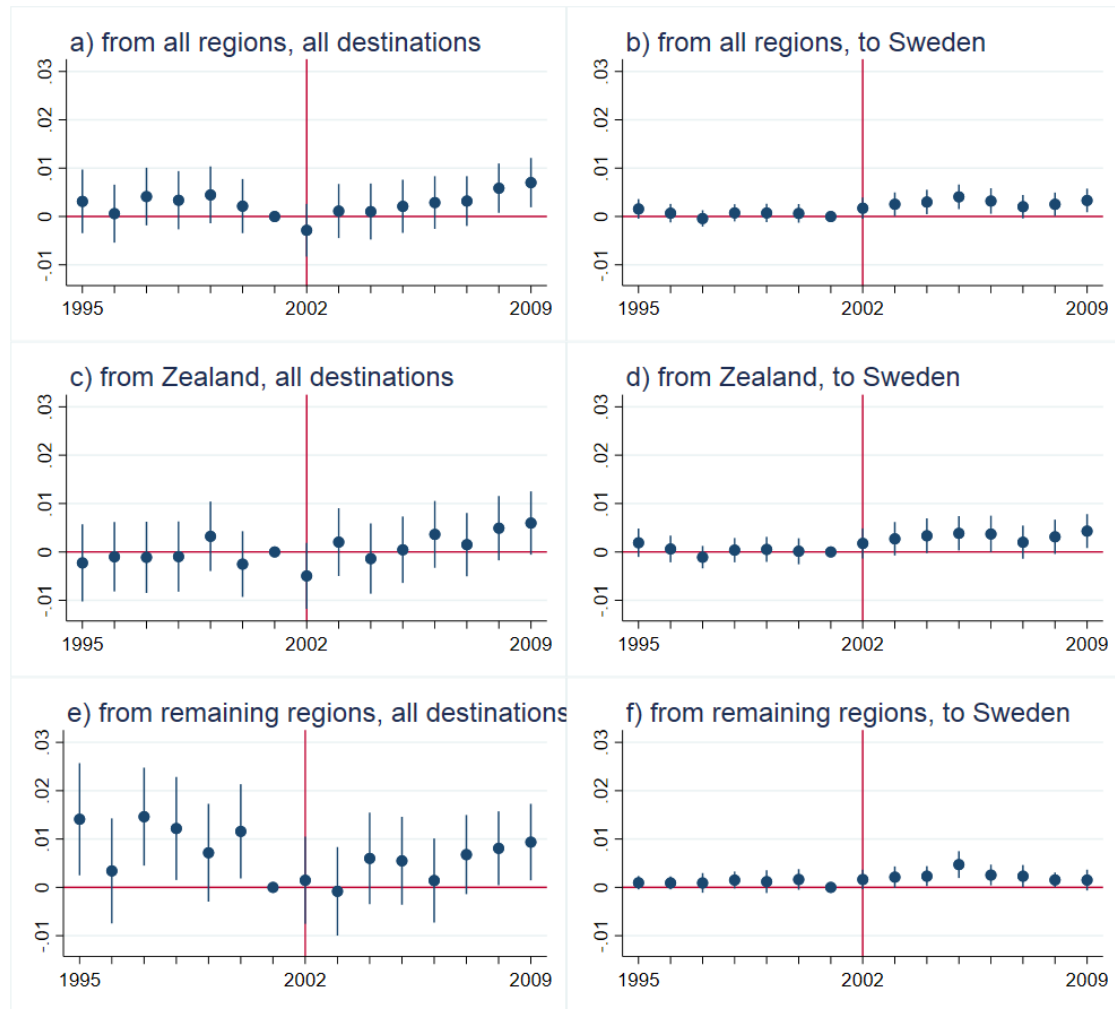
Figure B.8 – Coefficient plots for interaction effect on migration for Danish citizens with immigrant background and non-EU/EEA citizenship.

Notes: The sample includes non-EU/EEA citizens with immigrant background, older than 18 in a given year from 1995 to 2009. The treatment group are single individuals not cohabiting with a partner in a given year in Denmark. The control group are Danish citizens older than 18 years, cohabiting with a non-EU/EEA citizen in a given year in Denmark. Estimation includes a constant and dummy variables for *year* and *treatment*. The figure shows coefficient estimates for the interaction effect *treatment* x *year*. Confidence bounds show indicate statistical significance at the 5% level, standard errors being clustered at the individual level.
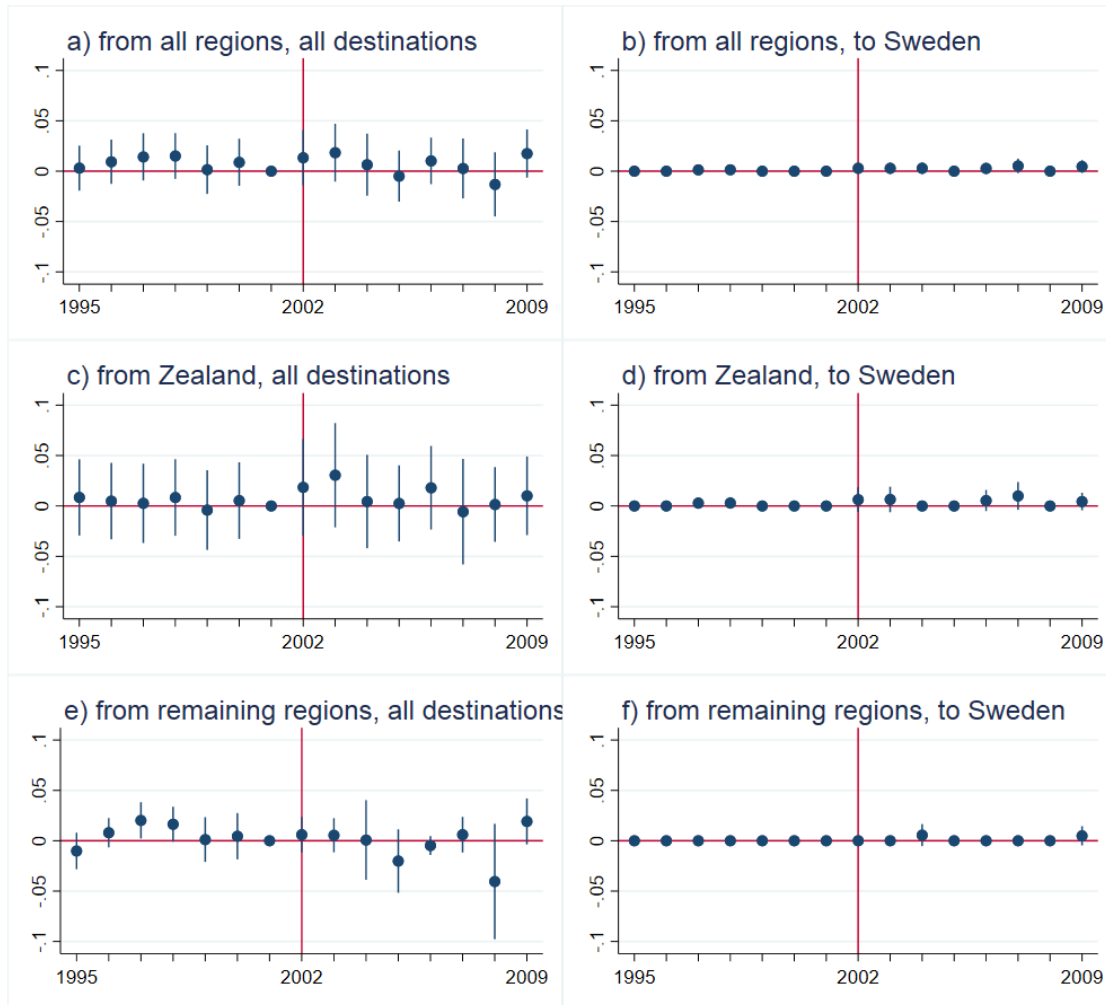
Figure B.9 – Coefficient plots for interaction effect on migration to Germany for Danish citizens with immigrant background.

Notes: The sample includes Danish citizens with immigrant background, older than 18 in a given year from 1995 to 2009. The treatment group are single individuals not cohabiting with a partner in a given year in Denmark. The control group are Danish citizens older than 18 years, cohabiting with a non-EU/EEA citizen in a given year in Denmark. Estimation includes a constant and dummy variables for *year* and *treatment*. The figure shows coefficient estimates for the interaction effect *treatment* x *year*. Confidence bounds show indicate statistical significance at the 5% level, standard errors being clustered at the individual level.
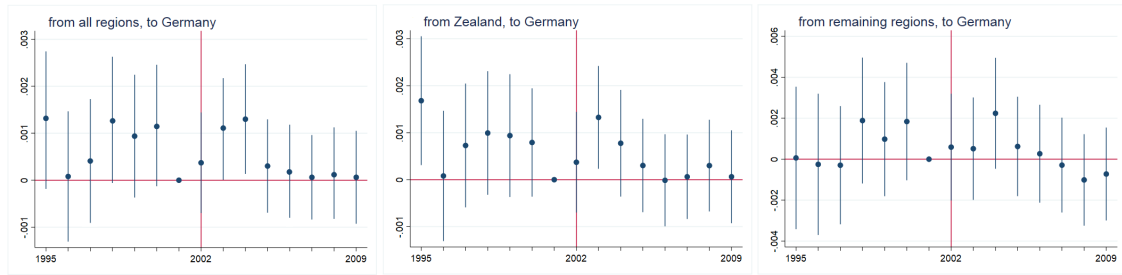
	Out-migration to all countries			Out-migration to Sweden		
	All	From Zealand	From remaining regions	All	From Zealand	From remaining regions
γ_{1995}	0.0016	0.00016	0.0047	-0.0001	-0.0007	0.0012
	(0.0026)	(0.0031)	(0.0048)	(0.00075)	(0.0010)	(0.0009)
γ_{1996}	0.0011	0.0015	-0.0020	-0.0010	-0.0018*	0.0009
	(0.0025)	(0.0028)	(0.0048)	(0.0008)	(0.0011)	(0.0008)
γ_{1997}	0.0044*	0.0024	0.0088**	-0.0020***	-0.0028***	-0.0002
	(0.0023)	(0.0028)	(0.0043)	(0.0007)	(0.0009)	(0.0008)
γ_{1998}	0.0007	0.0000	0.0023	-0.0010	-0.0019**	0.0007
	(0.0023)	(0.0027)	(0.0044)	(0.0007)	(0.0009)	(0.0008)
γ_{1999}	0.0046**	0.0059**	0.0018	-0.0010	-0.0018*	0.0009
	(0.0022)	(0.0026)	(0.0043)	(0.0007)	(0.0009)	(0.0011)
γ_{2000}	0.0007	-0.0016	0.0055	-0.0016**	-0.0027***	0.0008
	(0.0021)	(0.0024)	(0.0040)	(0.0008)	(0.0009)	(0.0008)
γ_{2001}	-	-	-	-	-	-
	-	-	-	-	-	-
γ_{2002}	0.0033	0.0029	0.0041	0.0026***	0.0033***	0.0012
	(0.0021)	(0.0025)	(0.0038)	(0.0008)	(0.0012)	(0.0008)
γ_{2003}	0.0107***	0.0178***	-0.0044	0.0127***	0.0174***	0.0030***
	(0.0021)	(0.0026)	(0.0038)	(0.0011)	(0.0015)	(0.0010)
γ_{2004}	0.0102***	0.0133***	0.0040	0.0116***	0.0158***	0.0038***
	(0.0021)	(0.0026)	(0.0038)	(0.0011)	(0.0015)	(0.0009)
γ_{2005}	0.0071***	0.0110***	-0.0005	0.0089***	0.0124***	0.0029***
	(0.0021)	(0.0025)	(0.0037)	(0.0010)	(0.0014)	(0.0008)
γ_{2006}	0.0092***	0.0155***	-0.0028	0.0120***	0.0168***	0.0041***
	(0.0020)	(0.0025)	(0.0036)	(0.0011)	(0.0016)	(0.0009)
γ_{2007}	0.0082***	0.0142***	-0.0030	0.0110***	0.0156***	0.0035***
	(0.0019)	(0.0024)	(0.0034)	(0.0010)	(0.0015)	(0.0009)
γ_{2008}	0.0084***	0.0135***	-0.0009	0.0111***	0.0151***	0.0049***
	(0.0019)	(0.0023)	(0.0032)	(0.0010)	(0.0015)	(0.0009)
γ_{2009}	0.0055***	0.0088***	-0.0004	0.0091***	0.0118***	0.0053***
	(0.0019)	(0.0023)	(0.0032)	(0.0010)	(0.0014)	(0.0010)
β_1	0.0150***	0.0134***	0.0184***	0.0027***	0.0036***	0.0007
	(0.0015)	(0.0017)	(0.0027)	(0.0005)	(0.0007)	(0.0005)
β_0	0.0111***	0.0110***	0.0115***	0.0011***	0.0014***	0.0002
	(0.0009)	(0.0011)	(0.0017)	(0.0003)	(0.0004)	(0.0002)
R-squared	0.005	0.006	0.004	0.006	0.009	0.002
Av.out-mig.rate 1995-2001	0.0208	0.0189	0.0251	0.0018	0.0021	0.0011
Observations	508,911	340,605	168,306	500,683	335,820	164,863

Source: Calculations based Danish register data.

Notes: The sample includes Danish citizens with immigrant background, older than 18 in a given year from 1995 to 2009. The treatment group are single individuals not cohabiting with a partner in a given year in Denmark. The control group are Danish citizens older than 18 years, cohabiting with a non-EU/EEA citizen in a given year in Denmark. Estimation include dummy variables for all years. Standard errors are clustered on the individual level. Stars denote levels at which coefficients are statistically significantly different from zero: *** 1% level, ** 5% level, * 10% level.

	Out-migration to all countries			Out-migration to Sweden		
	All	From Zealand	From remaining regions	All	From Zealand	From remaining regions
γ_{1995}	0.0032	0.0020	0.0061	0.0009	0.0007	0.0017*
	(0.0027)	(0.0031)	(0.0050)	(0.0008)	(0.0011)	(0.0009)
γ_{1996}	0.0022	0.0027	0.0012	-0.0003	-0.0010	0.0014
	(0.0025)	(0.0029)	(0.0050)	(0.0008)	(0.0011)	(0.0009)
γ_{1997}	0.0054**	0.0034	0.0099**	-0.0014*	-0.0021**	0.0002
	(0.0024)	(0.0029)	(0.0045)	(0.0007)	(0.0009)	(0.0008)
γ_{1998}	0.0009	0.0002	0.0024	-0.0007	-0.0014	0.0010
	(0.0024)	(0.0027)	(0.0045)	(0.0007)	(0.0010)	(0.0008)
γ_{1999}	0.0046**	0.0062**	0.0011	-0.0007	-0.0015	0.0011
	(0.0023)	(0.0027)	(0.0044)	(0.0008)	(0.0010)	(0.0011)
γ_{2000}	0.0004	-0.0014	0.0042	-0.0016**	-0.0028***	0.0011
	(0.0021)	(0.0025)	(0.0041)	(0.0007)	(0.0010)	(0.0008)
γ_{2001}	-	-	-	-	-	-
	-	-	-	-	-	-
γ_{2002}	0.0020	0.0021	0.0018	0.0025***	0.0031**	0.0012
	(0.0021)	(0.0025)	(0.0040)	(0.0009)	(0.0012)	(0.0008)
γ_{2003}	0.0096***	0.0171***	-0.0063	0.0126***	0.0172***	0.0029***
	(0.0022)	(0.0027)	(0.0039)	(0.0012)	(0.0016)	(0.0010)
γ_{2004}	0.0083***	0.0116***	0.0015	0.0112***	0.0153***	0.0035***
	(0.0022)	(0.0027)	(0.0039)	(0.0011)	(0.0016)	(0.0009)
γ_{2005}	0.0048**	0.0085***	-0.0025	0.0080***	0.0111***	0.0030***
	(0.0021)	(0.0026)	(0.0038)	(0.0010)	(0.0015)	(0.0009)
γ_{2006}	0.0070***	0.0132***	-0.0053	0.0112***	0.0155***	0.0042***
	(0.0021)	(0.0026)	(0.0037)	(0.0011)	(0.0016)	(0.0010)
γ_{2007}	0.0054***	0.0116***	-0.0062*	0.0098***	0.0141***	0.0030***
	(0.0020)	(0.0025)	(0.0035)	(0.0011)	(0.0016)	(0.0009)
γ_{2008}	0.0058***	0.0108***	-0.0031	0.0096***	0.0129***	0.0045***
	(0.0020)	(0.0024)	(0.0034)	(0.0011)	(0.0015)	(0.0010)
γ_{2009}	0.0027	0.0058**	-0.0028	0.0075***	0.0095***	0.0052***
	(0.0019)	(0.0024)	(0.0034)	(0.0010)	(0.0014)	(0.0011)
β_1	0.0091***	0.0078***	0.0111***	0.0003	0.0002	0.0000
	(0.0015)	(0.0018)	(0.0028)	(0.0006)	(0.0008)	(0.0005)
β_0	0.0145***	0.0140***	0.0163***	0.0027***	0.0048***	0.0002
	(0.0014)	(0.0018)	(0.0025)	(0.0007)	(0.0010)	(0.0007)
R-squared	0.008	0.009	0.007	0.008	0.011	0.003
Av.out-mig.rate 1995-2001	0.0208	0.0189	0.0251	0.0018	0.0021	0.0011
Observations	508,911	340,605	168,306	500,683	335,820	164,863

Source: Calculations based Danish register data.

Notes: The sample includes Danish citizens with immigrant background, older than 18 in a given year from 1995 to 2009. The treatment group are single individuals not cohabiting with a partner in a given year in Denmark. The control group are Danish citizens older than 18 years, cohabiting with a non-EU/EEA citizen in a given year in Denmark. Estimation includes a constant and dummy variables for *year, age, female, children*. Standard errors are clustered on the individual level. Stars denote levels at which coefficients are statistically significantly different from zero: *** 1% level, ** 5% level, * 10% level.

Table B.3 – Descriptive statistics (duration analysis).

	Treatment Group	Control Group
Emigration	2,815	323
Emigration to Sweden	1,439	143
Female	42%	56%
Children	2%	63%
Zealand residents	69%	74%
Born in Denmark	48%	40%
Observations	13,292	4,130

Source: Calculations based on Danish register data.

Notes: The sample includes Danish citizens with immigrant background, older than 18 and younger than 29 in 2001 (t=0). The treatment group are single individuals not cohabiting with a partner in year 2001 in Denmark. The control group are Danish citizens older than 18 years, cohabiting with a non-EU/EEA citizen in 2001. All individuals must be in the data for the full observation period if they do not emigrate, i.e. until 2009.

Figure B.10 – Kaplan-Meier estimates for emigration from Denmark to all destinations.
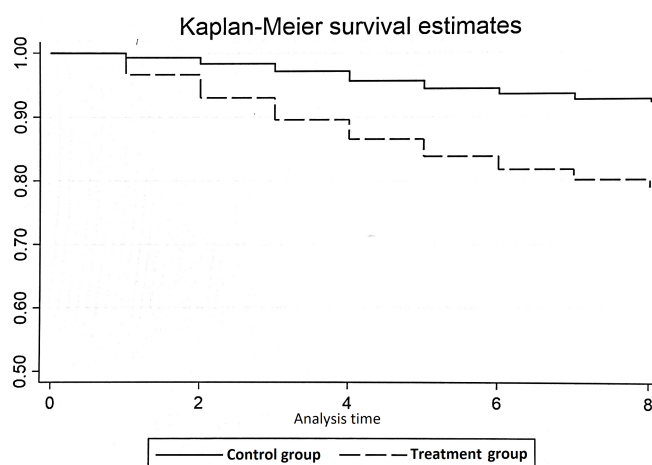
Source: Calculations based on Danish register data.

Notes: The treatment group are Danish citizens between 18 and 29 years old in 2001, not cohabiting with a partner in that year. The control group are Danish citizens between 18 and 29 years old in 2001, cohabiting with a non-EU/EEA citizen in 2001 in Denmark. Only individuals with immigrant background included. Individuals are excluded from the analysis if they drop out of the sample during the analysis period until 2009 and are not registered as emigrants.

C Swedish register data and how we identify the reunited couples

In this section we describe the way in which we identify the two types of affected couples in our data. There are (as we discussed in Section 2.2) two ways in which a Danish citizen can apply for family reunification in Sweden; either through the Swedish national rules or through the EU/EEA rules. These two different channels guide us in identifying the affected couples.

C.1 Couples where one partner is born in Denmark and the other one in a non-EU-country

Turning first to couples consisting of one partner born in Denmark (that has moved to Sweden) and the other one in a third country (outside EU) we proceed in the following way to identify the affected couples: We allow for partners to move to Sweden from (i) different countries or (ii) the same country as long as this country is not Denmark.

(i) captures couples that are not married (or in a registered partnership), in which the third country national would need to apply for a residence permit in the country of origin before a move to Sweden is possible.

(ii) captures couples immigrating from the same country, provided that country is *not* Denmark. If that country is not a member of the EU, it would be the case that the Danish-born partner had traveled to that country, met their spouse and the couple decided together to move to Denmark (Sweden), with the non-EU spouse in need of a permit. If that country is a member of EU (with the exception of Denmark), the non-EU spouse would still need a permit as the residence permit for one EU country is not valid for a different EU country if the stay is longer than three months.[40]

With respect to timing, we restrict our sample to couples who arrive within 6, 12 or 18 months of each other. This is to ensure that we capture both couples who apply under EU rules (with processing times up to 6 months) and couples who apply under Swedish rules (with longer processing times). We further restrict our sample to couples who are registered as belonging to the same household the year when the non-EU partner enters Sweden.[41] This is so as to not wrongly include couples who formed after their arrival in Sweden as single individuals.[42]

C.2 Couples where both partners are born in a non-EU country, with only one partner arriving from Denmark

In this case, if being born in a non-EU country is a good proxy for citizenship, the application for family reunification can only be made under Swedish rules. However, there can of course be individuals who are born in a non-EU country but who have Danish citizenship, therefore they are eligible to apply under either type of rules. As we explained in section 4.2, we are confident that the latter case is the dominant one here.

We keep all couples where both partners are born in a non-EU country, with the restriction that only one of them migrates to Sweden from Denmark for reasons outlined in section 4.2. All other restrictions are as before.

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[40]There is an exception to that rule: if the non-EU spouse had previously obtained long-term resident status in an EU country other than Denmark, Ireland and the United Kingdom, they may be able to transfer that status to Sweden.

[41]In our data, married couples and cohabiting couples who have a child together share a common identifier.

[42]See Niedomysl et al. (2010) who use the same definition in their study on marriage migrants in Sweden.

C.3 Verification of our definition of treatment

We check our definition of reunification against the data we have on "reason for migration".[43] The information on reason for migration is only available for years 1997 and onward, regardless of whether the move was done before 1997. For example, if someone moved in 1995, they will show up with missing reason for migration in the 1996 register year, but non-missing in 1997. This allows us to extend the variable to 1995 and 1996 without worrying about measurement error. We ignore further changes in residence permit and assign individuals the permit they obtained upon arrival in Sweden.

In Table C.1 we summarize the characteristics of the two types of couples affected by the reform (see Table 1). We see that regardless of the timing restriction (partners arriving within 6, 12, or 18 months from each other), the non-EU partner is in over 94% in Sweden on a family ties permit. This gives us confidence in our definition of reunification. Furthermore, for most of the remaining couples, the information on the reason for migration is missing so we can neither confirm nor deny the accuracy of our definition.[44]

Table C.1 – Sample size and characteristics for reunified couples arriving within n months of each other

	$n=6$	$n=12$	$n=18$
Number of couples	1778	2630	2974
% with family ties permit	94.66	95.48	95.26
% with missing information	4.39	3.33	3.21

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[43] "Reason for migration" ("Grund för bosättning") should be interpreted here as "type of residence permit"; a missing value for an EU individual simply indicates that that person does not need a residence permit. In our data we can identify four types of "reasons for migration": i) work, ii) family, iii) refugee or protected status, and iv) other.

[44] For the remaining couples, the reason for migration is different from family ties.

D   Additional empirical results on immigration to Sweden

Figure D.1 – Stricter reunification rules in Denmark and immigration to Sweden: Adding an additional break in 2003
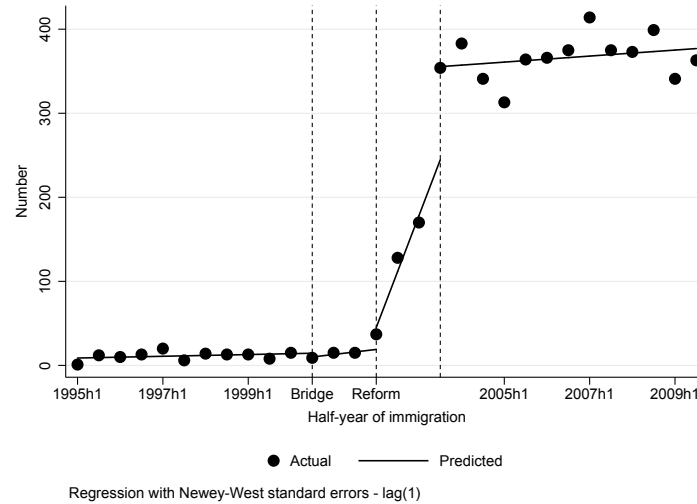
● Actual ——— Predicted

Regression with Newey-West standard errors - lag(1)

Source: Calculations based on Swedish register data.

Notes: The figure displays the regression results based on equation (2). The model is estimated using "Interrupted time series analysis" and Newey-West standard errors with one lag are used. Individuals belonging to following type of couples, that we consider treated, are included: i) couples where one partner is born in Denmark (and has moved to Sweden from Denmark) and the other in a non-EU country, and ii) couples where both partners are born in a non-EU country with at most one of them migrating from Denmark.

Table D.1 – Interrupted time series analysis results: no comparison group

Yearly number of partners	2002 treatment	2000 and 2002 treatments
2002 effect	184.19	179.87
	(65.73)	(67.90)
Change in trend post-2002	15.55	12.95
	(6.54)	(7.01)
2000 effect		-4.47
		(2.53)
Change in trend		2.48
2000-2002		(0.88)
Number of observations	30	30

Source: Calculations based on Swedish register data.

Notes: The figure displays the regression results based on equation (2). The model is estimated using "Interrupted time series analysis" and Newey-West standard errors with one lag are used. Individuals belonging to following type of couples, that we consider treated, are included: i) couples where one partner is born in Denmark (and has moved to Sweden from Denmark) and the other in a non-EU country, and ii) couples where both partners are born in a non-EU country with at most one of them migrating from Denmark.

Table D.2 – Interrupted time series analysis results: with comparison group

Yearly number of partners	Unaffected controls 2002 treatment	FI/NO controls 2002 treatment	Unaffected controls 2000 and 2002 treatments
Baseline mean level difference	3.70	-7.08	-2.45
	(4.23)	(3.96)	(3.81)
Baseline mean slope difference	-1.56	-1.58	-0.18
	(0.53)	(0.48)	(0.54)
2002 effect	125.44	191.54	122.07
	(68.11)	(66.06)	(71.76)
Change in trend post-2002	16.80	17.17	11.24
	(6.86)	(6.59)	(8.75)
2000 effect			-23.70
			(6.07)
Change in trend			4.18
2000-2002			(5.47)
Number of observations	60	60	60

Source: Calculations based on Swedish register data.

Notes: The figure graphically displays the regression results based on equation (3). The model is estimated using "Interupted time series analysis" and Newey-West standard errors with one lag are used. Individuals belonging to following type of couples are considered treated: i) couples where one partner is born in Denmark (and has moved to Sweden from Denmark) and the other in a non-EU country, and ii) couples where both partners are born in a non-EU country with at most one of them migrating from Denmark.The control group consists of couples where *both* partners immigrate from Denmark to Sweden as couples who migrate to Sweden for reasons *unrelated* to the possibility of family reunification.