Spillover Effects of Stricter Immigration Policies[a]

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Abstract

We provide evidence for the existence of spillover effects of national immigration policies by estimating the effect of stricter family reunification rules in Denmark on migration behavior. We reach three main conclusions. Using Danish register data, we first show that stricter rules for reunification led 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. Next, using Swedish register data, we find that affected individuals emigrating to Sweden actually came for family formation purposes. Finally, we demonstrate that not all individuals that came to Sweden to reunite with a partner stayed in the country; of those leaving, return migration to Denmark was most common. Our results indicate that potential spillover effects from national migration policies should be taken into account when forming migration policy.

Keywords: Spillover effects of public policies; Migration policy; family reunification; international migration
JEL classification: F22; J12; J15; K37

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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. At the heart of the discussion lies the role of national migration policies as drivers of refugees' and other immigrants' location choices. Even though there are centrally set guidelines and minimum requirements for immigration policies within the EU, variation across countries remains.

Family reunification has been one of the most important channels for migration to EU countries in the last two decades. In recent years, states have been making changes to their family reunification rules in an attempt to select "desirable" individuals. A recent example is the income requirement in the UK, which puts limits on the kind of individuals that can sponsor visas for family members (Sumption and Vargas-Silva, 2019). Family reunification is hence an important policy area, but also an area that has been studied to a much lesser extent than the labor immigration channel (Hatton, 2014).

The question we ask in this paper is whether those unable to reunify in one country, due to stricter immigration policies, nonetheless are able to bring their partners to Europe by migrating to neighboring countries with more favorable rules. We refer to such responses as spillover effects. Their existence is relevant because if policymakers 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 may materialize.

To examine this question, we exploit a change in Denmark's family reunification policies that took place in 2002. The reform made it much harder for Danish residents to form a couple with partners from outside the EU.[1] Since family reunification involves two sides, the sponsor and the partner, the reform potentially affected two migration flows: migration within Europe (the affected sponsors moving from Denmark to another country within Europe) and migration of the partners moving from non-EU countries to a European country other than Denmark.[2]

We make use of rich, individual-level, register data from two Nordic countries, Sweden and Denmark. First, applying a difference-in-differences design on Danish register data, we find that the emigration rate of individuals affected by the reform (Danish citizens with immigrant background) increased strongly after the reform, by up to 1.1 percentage points from very low pre-reform levels. We further find that by far the most popular destination was Sweden, a neighboring country with more generous rules for family reunification at the time.[3]

[1] Migration for family reasons is generally understood as either family reunification, where the family ties predate the arrival of the sponsor, or family formation, where typically the partners have likely never lived together in the same place previously. In our analysis, we are probably mainly capturing family formation.

[2] Throughout the paper, we use non-EU to designate all individuals from countries not part of the EU or the EEA.

[3] 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

Since the Danish register data analysis does not reveal whether the Danish emigrants eventually reunified, we turn to Swedish register data. We use this second set of population registers to investigate if the emigrants from Denmark to Sweden actually moved to Sweden to reunite with a partner. Applying an interrupted time series design, we find that the stricter rules for reunification led to a clear and significant increase in family-related migration to Sweden. The stricter reunification rules in Denmark therefore affected not only the within-Europe migration flows, but also the choice of destination country for those migrating from a non-EU country to the EU. Finally, we also demonstrate that not all of the individuals that came to Sweden to reunite with a family member stayed in the long-run.

This paper closely relates to a literature that (mainly) uses cross-country data and examines how differences in immigration policies in host countries are related to asylum seekers' choice of destination country (see, e.g., Hatton, 2009, 2016, Brekke et al., 2017, Ortega and Peri, 2009, Neumayer, 2004, Böcker and Havinga, 1998, and Andersson and Jutvik, 2018). Our paper is, to the best of our knowledge, the first to examine the causal effects of stricter reunification rules on international migration responses, or what we call spillover effects.

This paper also relates to the literature examining the effects of tax and welfare policies on households' migration behavior. The extent to which public policies affect migration behavior and location choices of households has been an important research question in public economics. The literature on welfare-related migration examines to what extent heterogeneous welfare policies across different jurisdictions affect welfare-prone individuals' migration behavior and location choices over these jurisdictions (see, e.g., Borjas, 1999, Brueckner, 2000, McKinnish, 2007, and Edmark, 2009). Similarly, the literature on tax-related migration studies how jurisdictions' tax-setting behavior affects the location choices of resource-strong individuals (see, e.g., Kirchgassner and Pommerehne, 1996, Liebig et al., 2007, Kleven et al., 2013a, and Kleven et al., 2013b). Whether immigration policies, and especially reunification policies, also affect households' location choices, has been studied to a much lesser extent.

The rest of the paper is organized as follows. In Section 2 we discuss the 2002 Danish reform, as well as the rules regulating family reunification in Denmark and Sweden, and we explain why Sweden is an attractive alternative residence country for couples reuniting after the reform. In Section 3 we describe the Danish register data, our methodological approach, and the estimated effects on emigration from Denmark. In Section 4 we turn to the analysis based on Swedish data: we describe the data, explain how we identify the reunified couples, report our interrupted time series analysis results and results from two robustness checks. In Section 5, we make use of the longitudinal aspect of the Swedish data and follow people's return migration behavior over time. Finally, in Section 6, we conclude.

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.

2 Stricter rules for family reunification and their 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 reunification, 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.

In our context, family reunification captures what is usually referred to as family formation. The term refers to couples who have likely never lived together in the same place previously.

2.1 Family reunification policies in Denmark

Family reunification between Danish residents (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).

Family reunification policies before 2002

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 2002 reform

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 of the same year (Skyt Nielsen et al., 2009). The changes include the introduction of: (i) the "24-year rule", according to which reunification on marriage grounds is impossible unless both parties are at least 24 years old, (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[4], and (v) a bank collateral amounting to 63,413 DKK

[4]There are no exact financial amounts given for what is considered to be the sponsor's ability to provide for their partner.

in case the family member benefits from social assistance after arrival (Rytter, 2013).[5]

Other reforms

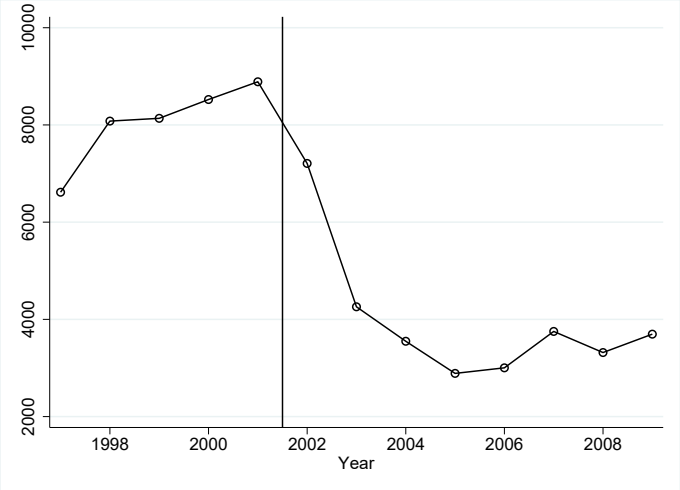
Further changes with regards to family reunification have occurred in subsequent years. During our study period, the "biggest" change came in July 2005. From then on, applicants for family reunification have had to sign a "declaration of integration", whereby they commit to making an effort to integrate.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

In 2002, the public income transfers to immigrants were cut through the introduction of the so-called "starthjaelp" ("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%. As we discuss later, our identification strategy relies on no other reforms happening at the same time that could affect our treatment group. We explain in detail in both sections 3 and 4 the reasons for why this reform should not pose a threat to identification.

Family reunification flows over time

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. In what follows, we explain why part of these flows might have been diverted to Sweden after 2002.

Figure 1 – Number of permits granted on family grounds in Denmark



Source: Statistics Denmark.
Notes: The figure captures the number of family ties permits granted yearly in Denmark from 1997 to 2009 (all relatives, not just spouses).

[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.

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 wanting to reunify with a non-EU partner had to move abroad or abstain from getting married if not fulfilling the criteria for reunification. In this section we argue that Sweden is an attractive destination for those wanting to reunite, both in terms of geographic closeness and family reunification rules.

Geographical proximity

Sweden is one of two countries, along with Germany, that has a close border connection to Denmark (Figure B.1a). Skåne, the southernmost region of Sweden, and eastern Denmark, the most densely populated area in Denmark, together form the Øresund region (Figure B.1b). The Danish side and the Swedish side of the region are well connected: via the Øresund bridge between Copenhagen and Malmö (30-minute train ride) and the ferry between Helsingör and Helsingborg (20-minute ferry ride). The ease of travel between the two sides of the border implies that individuals affected by the reform could live in Sweden, but continue working in Denmark. The possibility of commuting to work, together with the cultural and linguistic similarities between Denmark and Sweden effectively reduce moving costs and make Sweden a viable alternative.

Family reunification rules

At the time of the Danish reform, 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: national-level rules and EU-level rules. In our discussion, we focus on Danish *citizens* and their non-EU partners. Non-EU citizens permanently residing in Denmark would have to first obtain a Swedish residence permit for themselves, and then sponsor the partner. This is because 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.

Swedish rules

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. The non-EU spouse applies for a Swedish residence permit from their country of origin, unless the couple has already lived together outside of Sweden as a married couple or in a registered partnership, in which case the application can be done from Sweden. If the application is successful, the foreign spouse obtains a residence permit that is valid for two years, after which it is

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 reunification; both partners however had to be at least 18 years old (Pascouau et al., 2011).

EU rules

The other legal framework follows the Free Movement Directive at the European level mentioned 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).[6] 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.

Returning to Denmark

The couple can go back to Denmark 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.

Taken together, these reasons make Sweden an attractive and plausible alternative destination for reunification purposes for those affected by the reform. The arguments for moving to Germany for reunification purposes are weaker, which, as we show later, is reflected in the low emigration rates from Denmark to Germany.

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 by describing the Danish register data and defining the group affected by the reform. Next, we proceed by providing descriptives that are indicative of the reform causing an outflow of residents to Sweden. We then present difference-in-differences results showing that the reform had an effect on emigration rates of affected compared to unaffected residents to Sweden. Additional robustness tests confirm the findings from our main analysis.

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

3.1 Danish register data

To analyze whether the tightening of family reunification rules has affected out-migration from Denmark, we use Danish full population register data for the years 1995 to 2009. The data combines information on socio-economic characteristics of individuals residing in Denmark, such as their age, municipality of residence and family status. For each resident we can link these characteristics with migration data including the date of emigration and the destination country.[7] Furthermore, we can also link residents to their spouses (whether married or cohabiting).

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

Building on the insights from Section 2, we argue that Danish citizens with a non-EU immigrant background are potentially most affected by the policy change for two reasons. First, they can be expected to have ties to their home countries and, thus, are more likely to form a couple with a partner from a non-EU country. Second, the attachment requirement that came into effect with the policy we are studying is such that the partners must show proof of stronger affiliation to Denmark than to any other country, as measured by the combined number of years of residence in different countries. It is less likely for Danish citizens with immigrant background to fulfil this requirement if they spent part of their life in their country of birth.[8] 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. Furthermore, we restrict our attention to individuals who were 18 years or older in a given year.

From this population, 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 those individuals not cohabiting or married with a partner in Denmark as our treatment group that faces stricter rules for potential family reunification after the reform. As control group in our main analysis we consider individuals who are cohabiting or married with a non-EU partner. In this case, the non-EU partner must already be holding a residence permit, hence this type of couples should not be affected by the family reunification reform. To address concerns related to differential propensities to move for singles versus couples, in section 3.3 we conduct robustness tests with an alternative control group of *single* Danish citizens without immigrant background. In addition to stricter rules for family reunification, the introduction of the "starthjaelp" ("start help") program in 2002 which implied a substantial cut in income transfers to foreign and Danish citizens immigrating to Denmark after 2002, might be a reason for individuals to emigrate to Sweden and a potentially confounding factor for our analysis. However, as we show in section 4, we do not see any indication that higher immigration flows of affected individuals to Sweden were welfare-induced.

[7] In Denmark, it is compulsory to report out-migration when leaving the country for more than six months.

[8] We also conducted our analysis for Danish citizens without immigrant background and we did not observe any increase in emigration rates to Sweden.

Table 1 – Descriptive statistics

	Treatment group	Control group
Age	28.78	37.47
Female	41.54%	32.67%
Any children	7.32%	74.80%
Zealand residents	65.85%	68.71%
Born in Denmark	37.81%	12.60%
Country of origin		
Turkey	11.79%	28.22%
Pakistan	7.85%	12.42%
Former Yugoslavia	4.63%	5.46%
Bosnia	3.33%	2.50%
Observations	317,534	191,377

Source: Calculations based on Danish register data.
Notes: The treatment group are Danish citizens with immigrant background, older than 18 years, not cohabiting or married with a partner in a given year in Denmark. The control group are Danish citizens with immigrant background, older than 18 years, cohabiting or married with a non-EU 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 background in Denmark during the studied time period.Reported numbers refer to averages over the sample period 1995-2009.

We analyze panel data as 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. Given our definition of treatment and control group, demographic characteristics naturally 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. The share of individuals born in Denmark and the share of women is higher in the treatment group. In the treatment as well as in the control group, Turkey and Pakistan are the two most important countries of origin.

3.3 Empirical results on emigration from Denmark

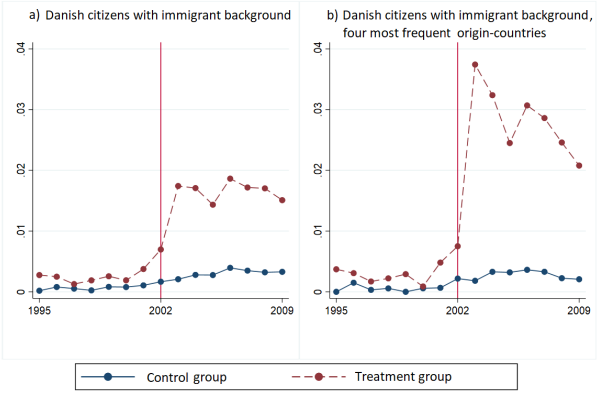
Emigration rates to Sweden before and after the reform

We start by analyzing whether emigration rates to Sweden increase more in the treatment group compared to the control group after stricter reunification requirements were implemented. As argued in Section 2, Sweden is a potential alternative destination for those who cannot fulfill the stricter family reunification rules in Denmark.[9] Figure 2 plots the yearly emigration rates to Sweden 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 2 includes all individuals in the treatment and control group in a given year, while in

[9]In the Appendix Figure A.1 we report emigration rates of the treatment group to Germany; compared to migration to Sweden the observed patterns are much weaker. In addition, the number of individuals who move to Germany as compared to Sweden is very low, as Figure A.2 shows. These findings give support to our arguments that Sweden is an attractive alternative destination for the reasons outlined in Section 2.

Panel b), we restrict to Danish citizens with immigrant background from one of the four most important countries of origin in Denmark: Turkey, Pakistan, Bosnia, and Former Yugoslavia (these countries account for more than 50% of the population with non-EU immigrant background in Denmark during the sample period).[10]

Figure 2 – Yearly emigration rates of treatment and control group to Sweden



Source: Calculations based on Danish register data.
Notes: The treatment group are Danish citizens with immigrant background, older than 18 years, not cohabiting or married with a partner in a given year in Denmark. The control group are Danish citizens with immigrant background, older than 18 years, cohabiting or married with a non-EU citizen in a given year in Denmark. Four most frequent origin-countries are Turkey, Pakistan, Former Yugoslavia and Bosnia.

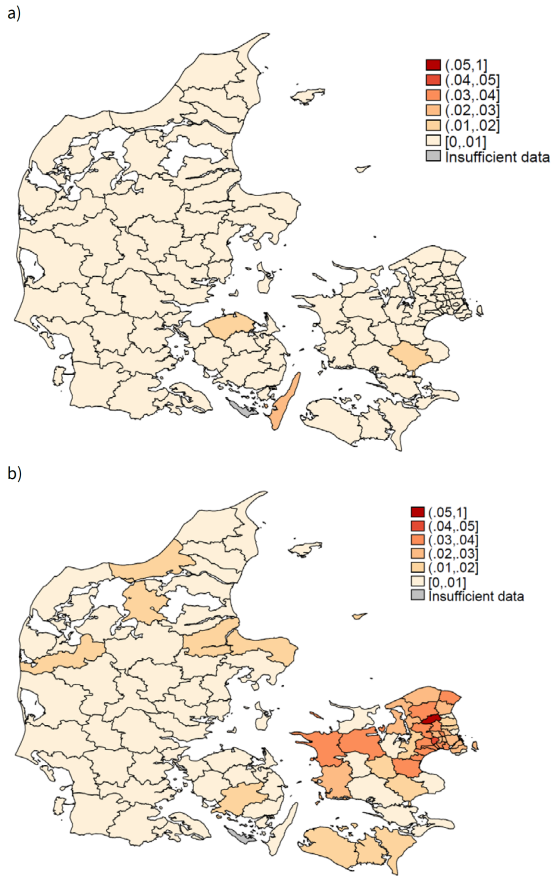
Figure 2 strongly suggests that the reform led to an outflow of individuals in the treatment group to Sweden. For example, among the four most frequent origin-countries 0.7 percent of the affected group emigrated from Denmark the year before the reform (2001); the corresponding figure was 3.9 percent the year after the reform (2003). Comparing the emigration rates of the treatment group to Sweden with emigration rates to all countries (Figure A.3), it becomes 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 from the four most important countries of origin in the two figures; 3.9/5.4).[11] In contrast to the increase in emigration rates for the treatment group, there is no visible change in emigration rates around the reform year for the control group. Before the reform, emigration rates for both treatment and control group evolve very similarly, which is a crucial identifying assumption for causal inference for our analysis.

In addition, Figure 3 indicates that the migrants moving to Sweden originate mostly from the neighboring municipalities in Zealand. This finding supports our argument that geographical proximity seems to make Sweden an attractive destination country for those affected by stricter rules for family reunification.

[10]When plotted separately, we see that no one country is responsible for the spike we observe in Panel b) of Figure 2 (see Figure A.5).

[11]The pattern is consistent with the descriptions found in Schmidt et al. (2009). We also provide emigration rates to Sweden on a half-year basis in Figure A.4 showing that the first increase in emigration rates to Sweden we observe in 2002 can be attributed to the second half of the year in which the reform was implemented.

Figure 3 – Average migration rates to Sweden of individuals in the treatment group by municipality, a) 1995-2001, b) 2003-2009



Source: Calculations based on Danish register data.
Notes: The treatment group are Danish citizens with immigrant background, older than 18 years, not cohabiting or married with a partner in a given year in Denmark. The figure indicates average emigration rates to Sweden by municipality in Denmark over the years 1995-2001 (a) and 2003-2009 (b).

Difference-in-differences estimation results

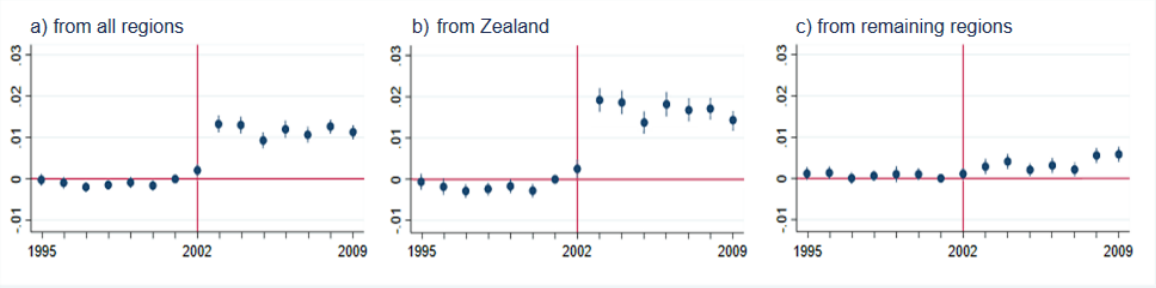
The descriptive evidence presented above suggests that individuals affected by the reform responded by emigrating to the areas in Sweden located closest to Denmark. We conduct a more formal test of this result and estimate the following difference-in-differences type of model:

$$EM_{it} = \alpha_0 + \alpha_1 Treat_{it} + \alpha_{2t} Y_t + \gamma_t (Treat_{it} * Y_t) + \alpha_{3t} X_{it} + e_{it} \quad (1)$$

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. $Treat_{it}$ 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. Y_t is a vector of year fixed effects. Our coefficients of interest are γ_t on the interaction terms between treatment status and the period dummies. Additional control variables are captured by X_{it} and include age, gender, the presence of children in the household, education level, labor force participation, and

unemployment. We estimate the pooled OLS model and cluster standard errors at the individual level to account for serial autocorrelation in the error term.[12]

Figure 4 – Coefficient plots for γ_t, the migration response of individuals in the treatment group 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 or married with a partner in a given year in Denmark. The control group are Danish citizens older than 18 years, cohabiting or married with a non-EU citizen in a given year in Denmark. Estimation includes a constant, dummy variables for *year* and *treatment*, dummy variables for age, gender, the presence of children in the household, education, labor force participation, and unemployment. The figure shows coefficient estimates for γ_t, the interaction effects of *treatment* x *year*. Confidence bounds show indicate statistical significance at the 5% level, standard errors being clustered at the individual level.

Figure 4 presents coefficient plots for γ_t (reference category: $t = 2001$, $D = 0$) in equation 1.[13] The estimates in Figure 4 confirm our findings from Figure 2. We plot the coefficients of the interaction term for all citizens with immigrant background in the treatment and control group in panel a), for Zealand residents only in panel b) and for residents from the remaining Danish regions in panel c). In the years before 2002 the coefficient estimates do not provide any evidence for a statistically significant difference in the likelihood of migrating from Denmark to Sweden between individuals in the treatment and control group.

According to the estimates presented in Panel a) of Figure 4, the probability of emigrating to Sweden increases by up to 1.1 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%.[14] Estimates in panels b) and c) of Figure 4 confirm the patterns depicted in Figure 3. The increase in the likelihood of emigrating to Sweden is stronger for those residents living in Zealand, the most densely populated island in Denmark and located closest to the Skåne region in Sweden. For treated individuals in the remaining regions estimated post-reform coef-

[12]Our estimation results are not sensitive to the set of covariates that we include. We even obtain very similar coefficients for γ when estimating the model without any additional demographic or socio-economic control variables (see Tables A.1 and A.2).

[13]Table A.1 reports the corresponding estimation results.

[14]In addition to the estimation results for emigration to Sweden, we also show results for emigration to all destination countries in panel (d) of Figure A.6 in the Appendix. Panel (e) of A.6 shows that the effect of the reform on emigration to Germany seems much weaker than for emigration to Sweden; when running the regressions for emigration to Germany separately for Zealand and the remaining regions, there is no statistically significant difference between treatment and control group in any of the two specifications. This supports our arguments that Sweden is a more attractive destination country than Germany for Danes affected by the reform.

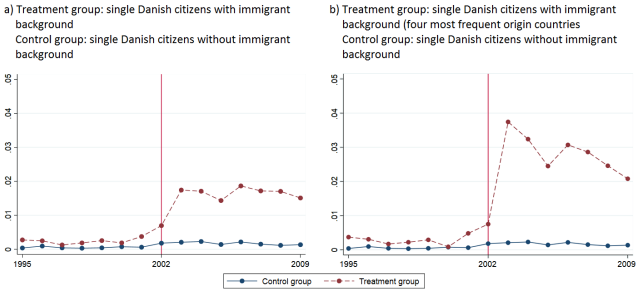
ficients for γ_t are much smaller. Furthermore, panels (a) and (b) in Figure A.6 in the Appendix show that the reform response is almost entirely driven by those individuals who are below the age of 29.

Next, we report results from two robustness tests that provide evidence in support of the validity of our identification strategy and of our findings above.

Robustness check 1: Alternative control group

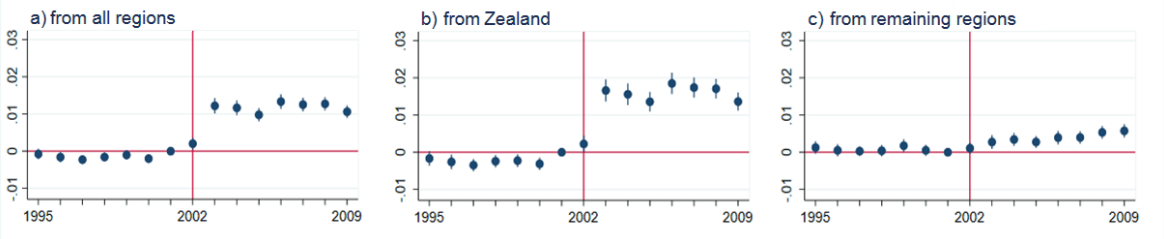
A potential concern when comparing single individuals in the treatment group and individuals with a partner in the control group is that couples are in general less mobile due to higher migration costs and colocation problems. Thus, we consider an alternative comparison group consisting of Danish citizens without immigrant background who are also single. Figure 5 shows no change in emigration rates after the reform for this alternative control group. We repeat regression 1 with the alternative control group and plot the coefficients γ_t in Figure 6. The results are very similar to those in our main analysis.

Figure 5 – Yearly emigration rates of treatment and control group (alternative definition) to Sweden



Source: Calculations based on Danish register data.
Notes: The treatment group are Danish citizens with immigrant background, older than 18 years, not cohabiting or married with a partner in a given year in Denmark. The control group are Danish citizens without immigrant background, older than 18 years, not cohabiting or married with a partner in a given year in Denmark. Four most frequent origin-countries are Turkey, Pakistan, Former Yugoslavia and Bosnia.

Figure 6 – Coefficient plots for γ_t, the migration response of individuals in the treatment group to Sweden with alternative control group definition



Source: Calculations based on Danish register data.
Notes: The sample includes Danish citizens, older than 18 in a given year from 1995 to 2009. The treatment group are single individuals with immigrant background, not cohabiting or married with a partner in a given year in Denmark. The control group are Danish citizens without immigrant background, not cohabiting or married with a partner in a given year. Estimation includes a constant and dummy variables for year, treatment, year x treatment. The figure shows coefficient estimates for γ_t. Confidence bounds show indicate statistical significance at the 5% level, standard errors being clustered at the individual level.

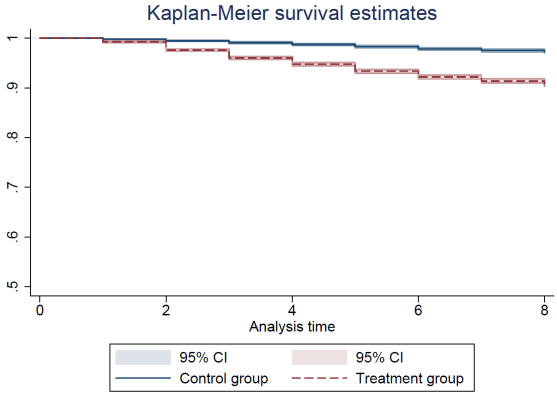
Robustness check 2: Duration analysis

As an additional robustness test, we estimate a simple duration model for a subset of individuals who are in the treatment and control group (as defined in the main analysis in this section) and who are between 18 and 29 years old before the reform in 2001.[15] We follow these individuals over time, until 2009. The sample consists only of those individuals who do not change treatment status, that is, who remain either single or married or cohabiting throughout the period. We show descriptive statistics for the sample used in this analysis in Table A.3 in the Appendix.

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 of leaving Denmark in the following years than those in the control group. This result also confirms our findings from Figure 4.

Results from the analyses in this section provide evidence for a causal effect of the Danish policy reform: treated individuals respond to stricter family reunification rules by emigrating to Sweden as an attractive alternative residence country. Estimates show that this response is both statistically and economically significant. However, the analysis of Danish data does not allow us to observe whether stricter family reunification rules actually led to an increase in family reunification in Sweden. To examine this, we need to turn to Swedish data.

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



Source: Calculations based on Danish register data.
Notes: The treatment group are Danish citizens between 18 and 29 years old in 2001, not cohabiting or married with a partner in that year. The control group are Danish citizens between 18 and 29 years old in 2001, cohabiting or married with a non-EU citizen in 2001 in Denmark. We include only individuals that remain in the treatment or control group in Denmark during the analysis period until 2009 or until they emigrate to Sweden.

[15] We observed the strongest change in emigration rates after the reform for young individuals (see panels (a) and (b) in Figure A.6). When we conduct the duration analysis without the upper age restriction the results are qualitatively similar.

4 Did the Danish reform affect reunification-related migration to Sweden?

In the previous section, we showed that the Danish reform caused affected individuals to emigrate to a larger extent than those unaffected. However, we have so far not provided evidence that the move was for reunification purposes. In this section, we turn to Swedish register data to examine if emigrants from Denmark reunify with a non-EU partner in Sweden. We first describe the data used in the analysis and explain how we identify the couples that came to reunite in Sweden as a consequence of the reform. We show that the reform caused not only an inflow of migrants from Denmark to Sweden, but also an inflow of non-EU partners to Sweden. We also provide a robustness check of our results. Finally, we show that many of the affected individuals left Sweden after a relatively short stay, with the majority returning to Denmark.

4.1 Swedish register data

To analyze the effect of the Danish reform on reunification-related migration to Sweden, we use the GeoSweden database, which contains register data from Statistics Sweden covering the full population between 1990-2014. The data set combines information from several different administrative registers and includes information on country of birth, date of immigration/emigration at the month-year-level, 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 others.[16]

4.2 Identifying affected couples

There are two sides involved in family reunification: the sponsors and the partners.

In order to enter our sample, the *sponsor* must have a connection to Denmark, either by being born in Denmark and/or by arriving from Denmark.[17] EU citizens residing in Denmark are not affected by the reform (see Section 2.1); therefore, we restrict sponsors that arrive from but are not born in Denmark to be born in a non-EU country.

The *partner* is the non-EU-born spouse that moves to Sweden via family reunification, from a country other than Denmark.

We define couples that reunify in Sweden as those partners and sponsors who i) arrive within 12 months of each other and ii) form a household during the year when the person that arrives the latest (in 99% of the cases, the non-EU partner) enters Sweden. The first restriction allows enough time for the applications to be processed. The second restriction makes sure we are not wrongly including couples who formed after their arrival in Sweden

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

[17] We proxy for citizenship using the country of birth and country of arrival variables.

as single individuals.[18] In addition, both sponsors and partners need to arrive between 1995 and 2009 and be 18 or above at the time of immigration.

Our data gives us the possibility to check our definition of reunification against the information we have on residence permits.[19] In Table 2 we see that among partners who arrive after 2002, 96% are on a family ties permit; among sponsors who arrive after 2002, almost 97% do not need residence permits. This high share gives us confidence in our definition of family reunification.

Table 2 – Sample size and residence permit information

	Arrival before 2002	*Arrival after 2002*
Number of sponsors	85	2545
% with family ties permit	12.94	1.34
% that don't need residence permits	78.82	96.78
Number of partners	79	2551
% with family ties permit	68.35	96.32
% that don't need residence permits	18.99	2.63

Notes: The sponsors are the individuals with a connection to Denmark, and the partners are the non-EU partners that reunify with them in Sweden. In our data, individuals that do not need residence permits are recorded with missing information on the permit variable.

4.3 Defining the control group

In constructing a control group, we wish to mimic the affected couples in terms of composition (either both spouses born in non-EU countries or just one of them) while making sure that both partners have a connection to Denmark. This eliminates the partner-sponsor dynamic that was present in the affected couples and thus eliminates the possibility that the control group couples would have moved to Sweden for family reunification reasons. We achieve this by considering couples where *both* partners immigrate from Denmark to Sweden. In this case, it is unlikely that they would have encountered problems with respect to permission to stay on marriage grounds in Denmark.[20]

Finally, Table 3 visually summarizes our definitions.

4.4 Description of the couples reuniting in Sweden

Table 4 shows the characteristics of those affected by the Danish reform, as compared to the control 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 among the unaffected group, which we are going to

[18] See Niedomysl et al. (2010) who also impose this restriction to define reunification between native Swedes and foreign partners.

[19] Our data allows us to distinguish between four types of residence permits: work, family, refugee or protected status, and other.

[20] We drop non-EU couples where neither partner arrives from Denmark, 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.

Table 3 – Definition of affected couples

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

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 2.1). Third, the partners arriving after the reform are less likely to have children. Fourth, after 2002, a significantly higher proportion of sponsors have labor income from Denmark after the move to Sweden, which suggests that they have kept their jobs in Denmark.[21]

In Section 2.2 we discussed the hypothesis that it is likely that geographic closeness matters for migration decisions, a hypothesis that is supported by the fact that migrants from Zealand (the easternmost 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 southernmost 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 individuals 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 suggests that emigrants from Denmark indeed moved to Sweden for reunification purposes. We conduct a more formal test of this hypothesis in the next subsection.

[21] In fact, a non-trivial share of sponsors keep their jobs in Denmark throughout the stay in Sweden (see Figure B.2 in the Appendix.

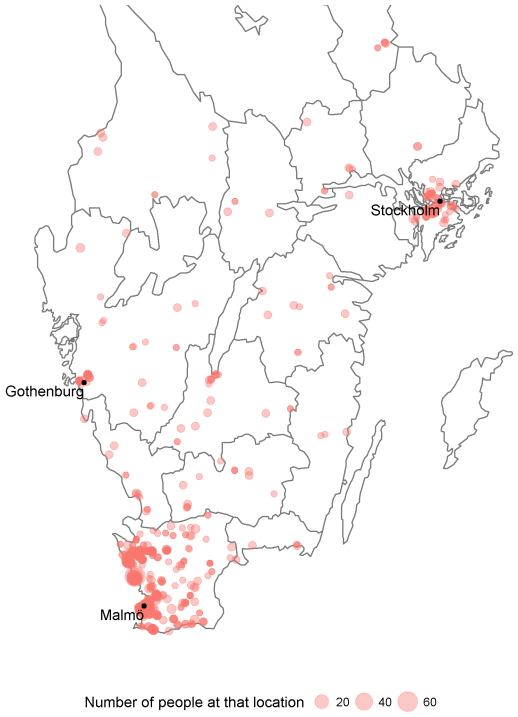
Table 4 – Descriptive statistics

	Arrival before 2002				Arrival after 2002			
	Affected			**Unaffected**	**Affected**			**Unaffected**
	All	*Sponsors*	*Partners*		*All*	*Sponsors*	*Partners*	
Age	36.87	38.56	35.04	37.09	27.96	29.20	26.72	34.96
Below 24	7.90	4.70	11.40	6.50	33.50	31.00	35.90	10.20
Female	48.78	30.59	68.35	50.00	50.04	44.87	55.19	50.00
Any children	52.44	51.76	53.16	69.57	28.45	28.45	28.46	59.90
Income from Sweden	31.71	37.65	25.32	22.10	8.63	10.41	6.86	8.31
Income from Denmark	7.32	10.59	3.80	7.25	37.77	74.11	1.53	54.06
Country of birth								
Denmark	37.80	72.90	0.00	24.30	27.90	55.90	0.00	26.90
Turkey	3.70	3.50	3.80	6.90	19.60	12.50	26.70	9.90
Pakistan	1.80	1.20	2.50	1.10	9.10	3.90	14.40	6.00
Former Yugoslavia	4.90	4.70	5.10	3.60	0.90	1.50	0.40	1.60
Bosnia	2.40	4.70	5.10	2.20	1.90	3.70	3.70	3.00
Observations	164	85	79	276	5096	2545	2551	1576

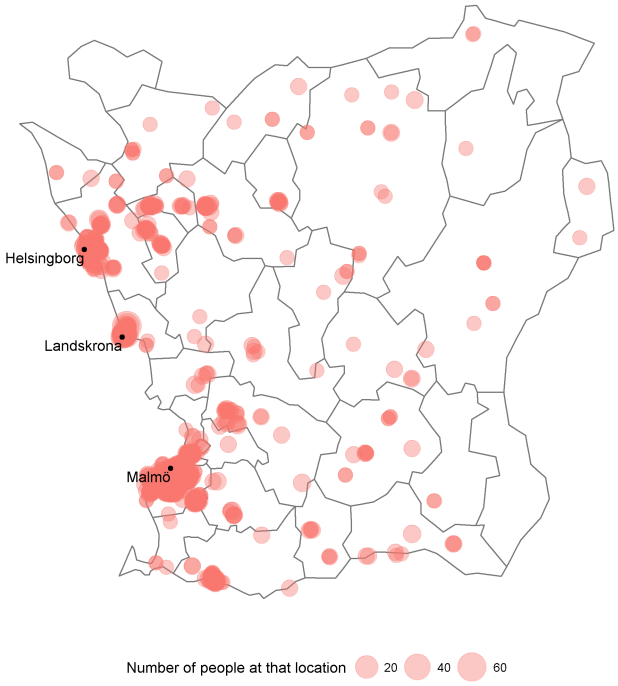
Notes: Statistics refer to the year of reunification. Income from Sweden is defined as having positive income from work in Sweden. Information on income from Denmark is only available from 2001 and onward.

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



Source: Calculations based on Swedish register data.
Notes: The size of each dot represents the number of individuals settling in a 100x100 area.

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

Econometric model

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). There are two main reasons for adopting an ITSA design. First, given that we have no cross-sectional variation in treatment when using data from the Swedish registers, a difference-in-differences framework, as the one we employed in the analysis on Danish data, is not possible.

Second, given that we have to rely solely on time-series variation for identification, adopting a regression discontinuity in time (RDiT) design, where the running variable is time, is not suitable. There are three main reasons for that (see Hausman and Rapson, 2018): (i) the design requires observations far from the threshold to get enough observations (in RDD terms, it requires a large bandwidth), (ii) it requires that the time-series nature of the underlying data-generating process is taken into account (e.g., autocorrelation), and (iii) the McCrary density test, an important and standard test in the RDD design, is not possible to apply in an RDiT design without cross-sectional variation (when the running variable is uniform, as in the case of time, the test becomes irrelevant).

Since the identifying variation in an RDiT design is similar to that in an Interrupted Time Series Model (Shadish et al., 2002; Hausman and Rapson, 2018), and since it is difficult to apply the standard RDD tests in an RDiT setup, we have chosen to use the Interrupted Time Series approach in this paper.[22] 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. In terms of coefficients, 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.

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).[23]

[22] 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.

[23] 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.

There are two assumptions that need to be fulfilled for the ITSA to provide causal effects: constant pre-reform trends in the outcome variable and no other reforms happening at the same time that might have affected the treatment group. As we have discussed in earlier sections, we know of no other reforms happening in Denmark at the same time as the reunification reform that we are studying that would affect the treatment group. In addition, we know of no reforms or policy changes happening in Sweden in 2002 that would attract the individuals in the treatment group. The identifying assumptions will be discussed as we present the results.

Baseline results

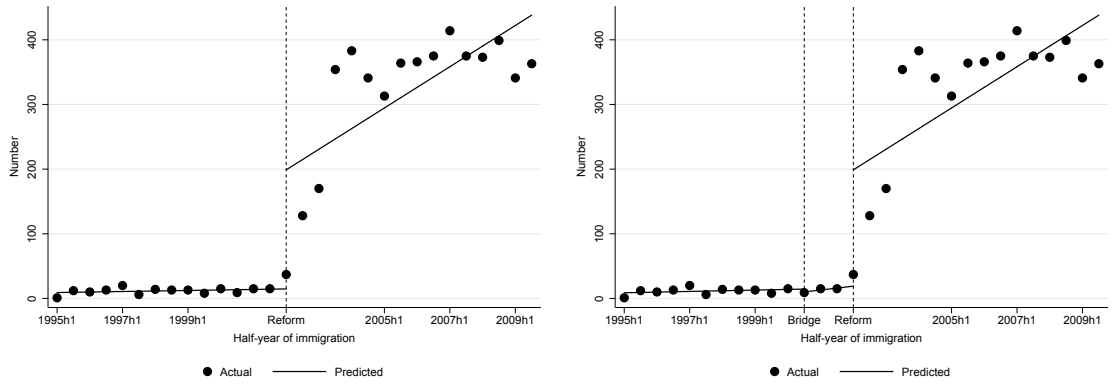
A graphical view of our results, where we plot both actual immigration flows and the flows predicted by the model in equation (2), is presented in Figure 9a. There are three things that can be noted from the figure. First, as was apparent from the summary statistics in Table 4, very few affected individuals migrated to Sweden to form a couple before the reform was instigated in 2002. The constant pre-reform trend is also very re-assuring given the identifying assumption of the ITSA. 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 (see column (1) in Table B.1 in the appendix).[24]

A concern one might have with the ITSA-specification in equation (2) is the potential interfering effects from the opening of the Øresund Bridge in July 2000.[25] Since the Øresund 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 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)

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

[25] 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.

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 "Interupted time series analysis" and Newey-West standard errors with one lag are used. Regression estimates are found in Table B.1 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.

Robustness check 1: Adding a control group

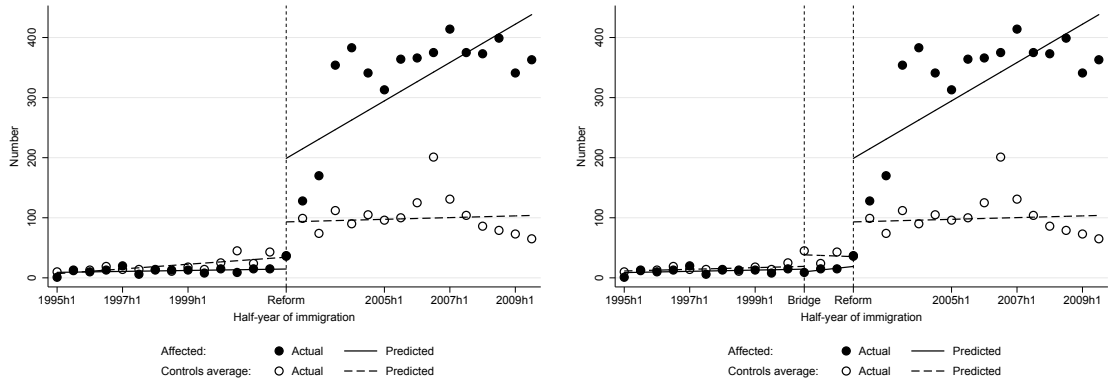
Campbell and Stanley (1966) and Shadish et al. (2002) argue that the ITSA has the potential to provide good internal validity, especially when applied to both a treatment and a control group. For this reason, we check the robustness of our baseline results by combining the ITSA analysis in equation (2) with a control group approach:

$$IM_t = \gamma_0 + \gamma_1 T_t + \gamma_2 D_t + \gamma_3 D_t \times T_t + \gamma_4 TREAT_t + \gamma_5 TREAT_t \times T_t + \gamma_6 TREAT_t \times D_t + \gamma_7 TREAT_t \times T_t \times D_t + u_t \quad (3)$$

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 3 for definitions of affected and unaffected). Coefficients $\gamma_4 - \gamma_7$ hence refer to the treatment group and coefficients $\gamma_0 - \gamma_3$ 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 Øresund 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 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.[26] 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 **??** 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 B.2 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.

Robustness check 2: The Danish Start Help program

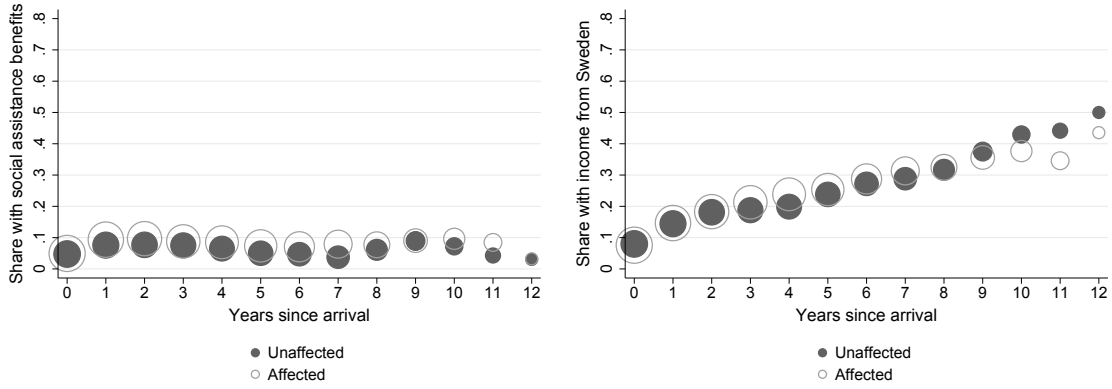
As mentioned earlier, an important assumption for the ITSA to provide causal estimates is that there were no other reforms in Denmark that affected the emigration behavior of our treatment group and that were instigated at the same date as the reunification reform went into effect.

As we discussed in Section 3, we know of no other reform that would fall in this category, apart from the Start Help program whose financial impact could potentially have lead to welfare-related emigration. To get an indication of whether this is the case, we examine whether those that came to Sweden as a consequence of the stricter reunification rules in

[26] 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 B.2 in the Appendix).

Denmark used the more generous Swedish rules for welfare recipiency. From Figure 11a we see that the welfare-migration story has little support: only a small share of individuals in both affected and unaffected couples receive social assistance benefits and if anything, the share goes slightly down with years since arrival. In fact, the share of individuals with income from Sweden increases with time spent in Sweden (Figure 11b).

Figure 11 – Social assistance benefits and income from Sweden



(a) Social assistance benefits

(b) Income from Sweden

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. In panel (b), income refers to labor income only. 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.

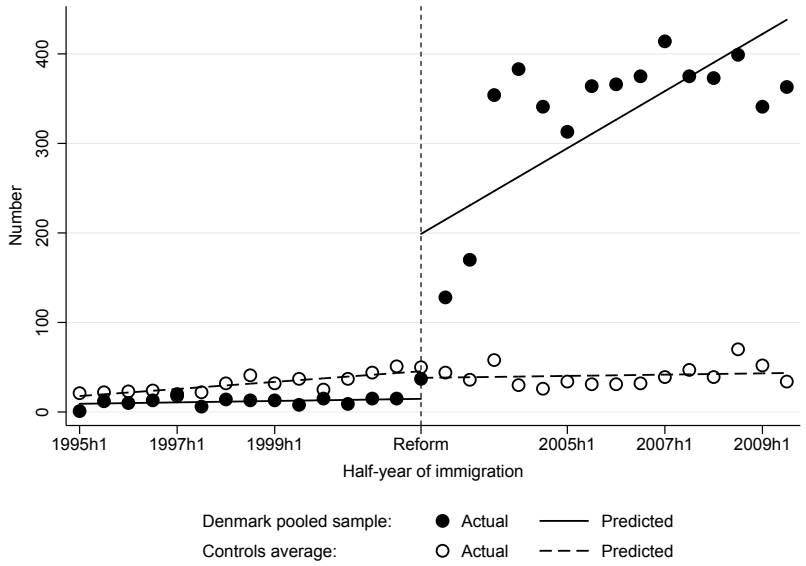
Robustness check 3: Other reforms in Sweden

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 onward. 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.[27]

The results, presented in Figure 12, 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.

[27] An important assumption here is that there were no major changes in the family reunification policies in Norway and Finland, which is indeed the case. The same goes for the reunification policies in Sweden.

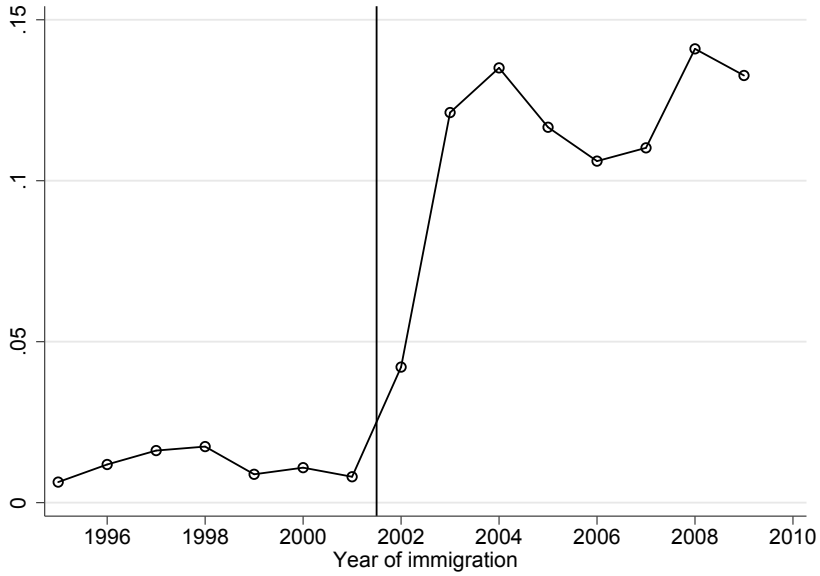
Figure 12 – Stricter reunification rules in Denmark and immigration to Sweden: Comparing with immigration from Finland and Norway



Source: Calculations based on Swedish register data.
Notes: The figure graphically displays the regression results based on equation (3). The model is estimated using "Interupted time series analysis" and Newey-West standard errors with one lag are used. Regression estimates are found in Table B.3 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 9–12 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 our results in perspective, we do the following exercise: we calculate the number of potential sponsors (either born in Denmark or non-EU arriving from Denmark) who move to Sweden between 1995 and 2009. We then compute the share of these that end up reunifying with a non-EU partner according to our definition of reunification (arriving within 12 months of each other and forming a couple the same year). Figure 13 shows that moving to Sweden for reunification was a very rare event before the reform, whereas after the reform, consistently above 10% from 2003 to 2009 of all potential sponsors were moving to Sweden for this purpose.

Figure 13 – Share of individuals born in Denmark or non-EU born arriving from Denmark who eventually reunify



From Denmark's point of view, the policy was effective if it was able to stem the flows of non-EU partners to Denmark. Our results suggest that when looked at in this way, the policy was indeed effective. However, it can also be the case that the flows were only temporarily stemmed. We turn to this question next.

5 After reunification: Is there any return migration to Denmark?

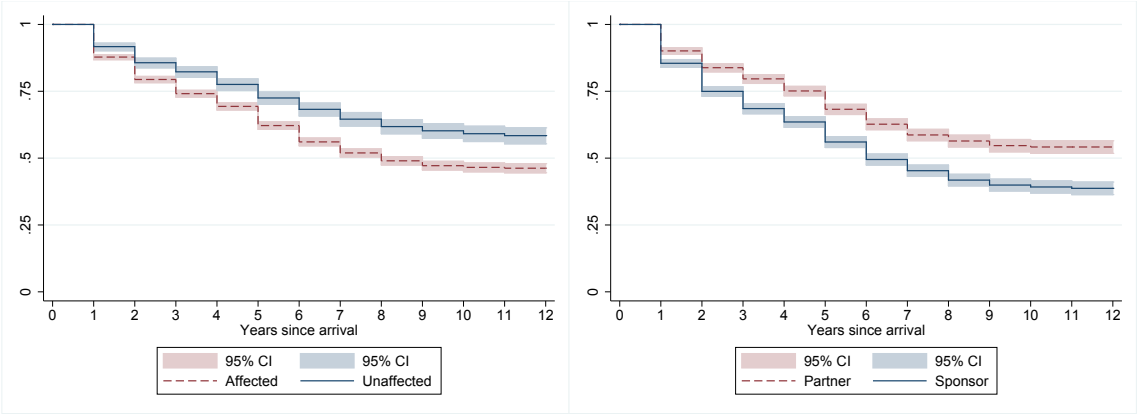
Our results from the previous subsection strongly indicate that the tougher immigration policies implemented in Denmark in 2002 caused some of the affected individuals to respond by moving to Sweden. The move to Sweden might have been either a temporary one - used to be able to reunite with a partner and then return to Denmark - or a more permanent one. It is ex-ante difficult to say whether we should expect the affected couples to leave Sweden to a larger extent. 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 for both groups 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. At the same time, the 2002 reforms made Denmark less welcoming to migrants in general, which might have lowered both groups' 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 a non-EU country.

To shed light on return migration patterns, we follow partners in treated and control

couples (as defined in section 4.1) 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.[28]

In Figure 14, we plot Kaplan-Meier survival estimates by years since immigration, for the affected and the unaffected groups arriving after 2002. We draw three main conclusions. First, as Figure 14a shows, a non-trivial 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).[29] 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 14b) and comparing the sponsors (dotted line) with the partners (solid line), it is also clear that the former group emigrates from Sweden to a larger extent than the latter group.

Figure 14 – Onward migration



(a) Affected vs. unaffected

(b) Only affected, by sponsor status

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 sponsor status.

Next, we examine the destination countries of those that emigrate. In Table 5, we see that the absolute majority (around 87 percent) of the individuals in the affected group that leave Sweden go to Denmark. This figure is also larger than the corresponding figure for the unaffected group (around 80 percent). Focusing on the affected group, we find that as many as 93 percent of the sponsors go back to Denmark (conditional on emigrating at

[28] 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.

[29] 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.

all). The corresponding figure is lower for partners (79.8 percent).

Table 5 – Onward migration statistics

	Affected			**Unaffected**
	All	Sponsors	Partners	
% leaving Sweden before 2014	53.10	60.10	46.10	42.40
Conditional on leaving				
% going to Denmark	87.10	92.70	79.80	80.10
% going to their home country	4.30	0.70	9.00	5.50
% going elsewhere	8.60	6.60	11.20	14.30
Mean no. of years in SE	2.95	2.95	2.96	3.12
(st. dev. in parentheses)	(2.45)	(2.44)	(2.47)	(2.64)
Observations	5095	2544	2551	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.

6 Conclusions

In this paper we address three questions. First, we examine if and to what extent tougher reunification 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 investigate if those that emigrate following tougher reunification rules actually reunite with a partner in the new country. Third, 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.

Using Danish register data, we find strong evidence in support of the reform causing an increase in emigration from Denmark. After 2002 our results show a statistically significant increase of the likelihood to emigrate for those affected by the reform. Our analysis shows that Sweden absorbed the absolute majority of those potentially affected by the Danish reform. We also show that the increase in the likelihood of emigrating to Sweden is stronger for the Danish residents residing in Zealand, the Danish region closest to Sweden.

Turning to Swedish register data, we show via an interrupted time series analysis that the reform caused not only an inflow of migrants from Denmark to Sweden, but also an inflow of non-EU partners to Sweden. The Swedish data analysis allows us to provide evidence that the Danish emigrants indeed moved to Sweden for family reunification purposes. While this 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.

With the use of Swedish data we can also rule out alternative explanations to the strong immigration flow to Sweden following the reform. We rule out that the opening of the Øresund bridge, that connects Copenhagen (the capital of Denmark) with Malmö (the third largest city of Sweden), just two years before the reform can explain the inflow, or that there is something else happening in Sweden around the years of the reform that made it particularly attractive to migrant couples. We also rule out that the observed emigration from Denmark is driven by the 2002 Start Help reform; there are no indications of welfare-induced migration in the Swedish data.

Even though the Nordic Agreement makes mobility and residency among the Nordic countries special, the Free Movement Directive at the European level implies that the results in this paper can be generalized to other (neighboring) countries within the EU. EU citizens can exercise their freedom of movement right within the EU, and as long as the sponsor can provide proof of legal residence in the new country (e.g., studying or working), reunification is possible under the EU reunification rules.

One explanation of the magnitude of the effect 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. Examining where the affected immigrants locate in Sweden, we find that, to a very large extent, they locate in the southernmost region in Sweden (and then mainly in the cities with very good bridge and ferry connections with Zealand; Malmö and Helsingborg).

Finally, regarding the third question, our results show that not all those that migrated to Sweden as an effect of the reform in Denmark stayed permanently in Sweden; 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 higher for the affected group than for a similar but unaffected group. Moreover, the majority of those that out-migrate after forming a couple in Sweden go back to Denmark.

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 such 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 policymakers 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 is likely to materialize. Evidence on this, in combination with the evidence 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.

References

Andersson, H. and K. Jutvik (2018): "Do Asylum Seekers Respond to Policy Changes? Evidence from the Swedish-Syrian Case," Mimeo Uppsala University.

Böcker, A. and T. Havinga (1998): "Asylum applications in the European Union: Patterns and trends and the effects of policy measures," *Journal of Refugee Studies*, 11, 245–266.

Borjas, G. J. (1999): "Immigration and Welfare Magnets," *Journal of Labor Economics*, 17, 607–637.

Brekke, J.-P., M. Røed, and P. Schøne (2017): "Reduction or deflection? The effect of asylum policy on interconnected asylum flows," *Migration Studies*, 5, 65–96.

Brueckner, J. K. (2000): "Welfare Reform and the Race to the Bottom: Theory and Evidence," *Southern Economic Journal*, 66, 505–525.

Campbell, D. T. and J. C. Stanley (1966): *Experimental and Quasi-Experimental Designs for Research*, Houghton Mifflin Company.

Dahlberg, M. and K. Edmark (2008): "Is there a ''race-to-the-bottom'' in the setting of welfare benefit levels? Evidence from a policy intervention," *Journal of Public Economics*, 92, 1193–1209.

Dustmann, C. and J. Görlach (2015): "Selective out-migration and the estimation of immigrants' earnings profiles," in *Handbook of the Economics of International Migration*, vol. 1, 489–533.

Edin, P.-A., R. J. LaLonde, and O. Åslund (2000): "Emigration of Immigrants and Measures of Immigrant Assimilation: Evidence from Sweden," *Swedish Economic Policy Review*, 163–204.

Edmark, K. (2009): "Migration Effects of Welfare Benefit Reform," *Scandinavian Journal of Economics*, 111, 511–526.

Hatton, T. J. (2009): "The Rise and Fall of Asylum: What Happened and Why?" *The Economic Journal*, 119, F183–F213.

——— (2014): "The economics of international migration: A short history of the debate," *Labour Economics*, 30, 43–50.

——— (2016): "Refugees, Asylum Seekers, and Policy in OECD Countries," *American Economic Review*, 106, 441–45.

Hausman, C. and D. S. Rapson (2018): "Regression Discontinuity in Time: Considerations for Empirical Applications," Working Paper 23602, NBER Working Paper Series.

Hedetoft, U. (2006): "Denmark: Integrating immigrants into a homogeneous welfare state," *Migration Information*.

Jensen, P. and P. J. Pedersen (2007): "To Stay or Not to Stay? Out-Migration of Immigrants from Denmark," *International Migration*, 45, 87–113.

Kirchgassner, G. and W. W. Pommerehne (1996): "Tax harmonization and tax competition in the European Union: Lessons from Switzerland," *Journal of Public Economics*, 60, 351–371.

Kleven, H. J., C. Landais, and E. Saez (2013a): "Taxation and International Migration of Superstars: Evidence from the European Football Market," *American Economic Review*, 103, 1892–1924.

Kleven, H. J., C. Landais, E. Saez, and E. Schultz (2013b): "Migration and Wage Effects of Taxing Top Earners: Evidence from the Foreigners' Tax Scheme in Denmark," *The Quarterly Journal of Economics*, 129, 333–378.

Liebig, T., P. A. Puhani, and A. Sousa-Poza (2007): "Taxation and Internal Migration - Evidence from the Swiss Census Using Community-Level Variation in Income Tax Rates," *Journal of Regional Science*, 47, 807–836.

Linden, A. et al. (2015): "Conducting interrupted time-series analysis for single-and multiple-group comparisons," *The Stata Journal*, 15, 480–500.

McKinnish, T. (2007): "Welfare-induced migration at state borders: New evidence from micro-data," *Journal of Public Economics*, 91, 437 – 450.

Neumayer, E. (2004): "Asylum destination choice. What makes some countries more attractive than others?" *European Union Politics*, 5, 155–180.

Niedomysl, T., J. Östh, and M. Van Ham (2010): "The globalisation of marriage fields: The Swedish case," *Journal of Ethnic and Migration Studies*, 36, 1119–1138.

Ortega, F. and G. Peri (2009): "The causes and effects of international migrations: Evidence from OECD countries 1980-2005," Working Paper 14833, NBER Working Paper Series.

Pascouau, Y., H. Labayle, and N. K. Šalamon (2011): *Conditions for family reunification under strain: A comparative study in nine EU member states*, King Baudouin Foundation.

Rytter, M. (2013): *Family upheaval: Generation, mobility and relatedness among Pakistani migrants in Denmark*, vol. 21, Berghahn Books.

Schmidt, G., B. K. Graversen, V. Jakobsen, T. G. Jensen, and A. Liversage (2009): *Ændrede familiesammenføringsregler: Hvad har de nye regler betydet for pardannelsesmønstret blandt etniske minoriteter? What have the new regulations meant for patterns in partner selection by ethnic minorities?*, SFI-Det Nationale Forskningscenter for Velfærd.

Shadish, W., T. Cook, and D. Campbell (2002): *Experimental and Quasi-experimental Designs for Generalized Causal Inference*, Houghton Mifflin.

Skyt Nielsen, H., N. Smith, and A. Celikaksoy (2009): "The Effect of Marriage on Education of Immigrants: Evidence from a Policy Reform Restricting Marriage Migration," *The Scandinavian Journal of Economics*, 111, 457–486.

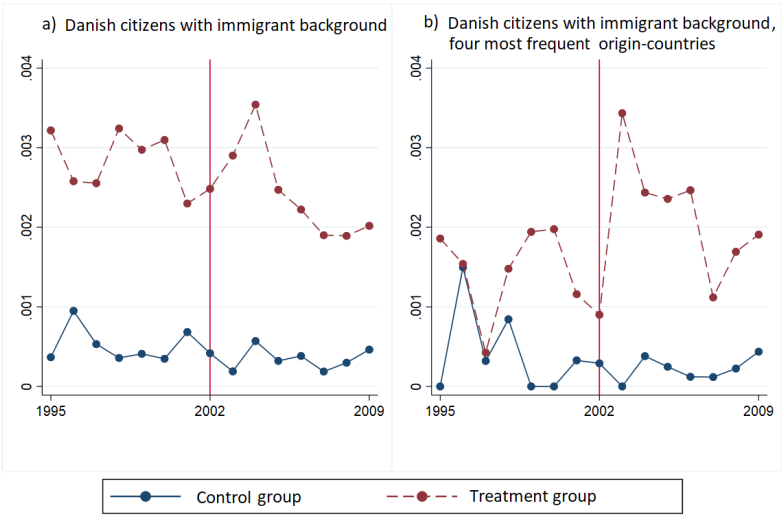
Sumption, M. and C. Vargas-Silva (2019): "Love is not all you need: income requirement for visa sponsorship of foreign family members," *Journal of Economics, Race, and Policy*, 2, 62–76.

Van den Broucke, S., L. Vanduynslager, and P. De Cuyper (2016): "The EU Family Reunification Directive Revisited. An analysis of admission policies for family reunification of Third Country Nationals in EU Member States," Policy Research Centre Integration; Antwerp, Belgium.

Appendices

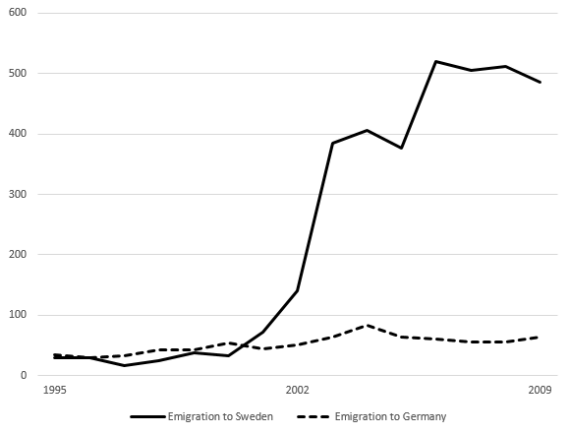
A Additional empirical results on emigration from Denmark

Figure A.1 – Yearly emigration rates of treatment and control group to Germany



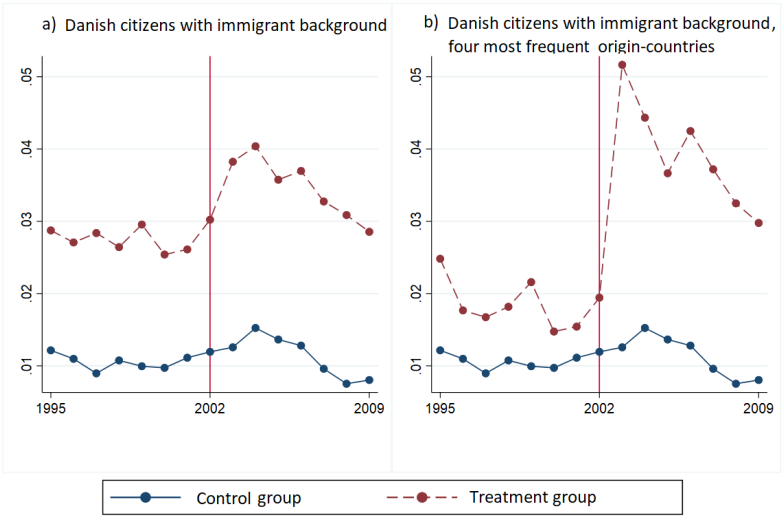
Source: Danish register data.
Notes: The treatment group are Danish citizens with immigrant background, older than 18 years, not cohabiting or married with a partner in a given year in Denmark. The control group are Danish citizens with immigrant background, older than 18 years, cohabiting or married with a non-EU citizen in a given year in Denmark.

Figure A.2 – Number of emigrants with immigrant background in treatment group to Germany and Sweden



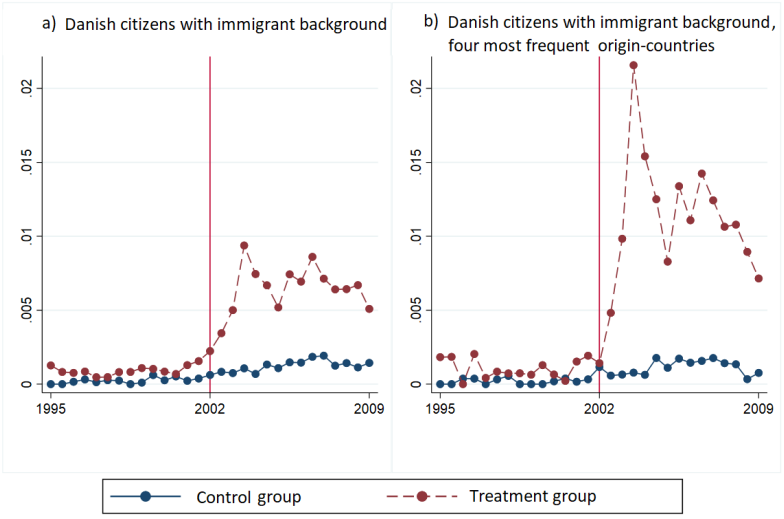
Source: Danish register data.
Notes: The treatment group are Danish citizens with immigrant background, older than 18 years, not cohabiting or married with a partner in a given year in Denmark. The control group are Danish citizens with immigrant background, older than 18 years, cohabiting or married with a non-EU citizen in a given year in Denmark.

Figure A.3 – Yearly emigration rates of treatment and control group to all countries



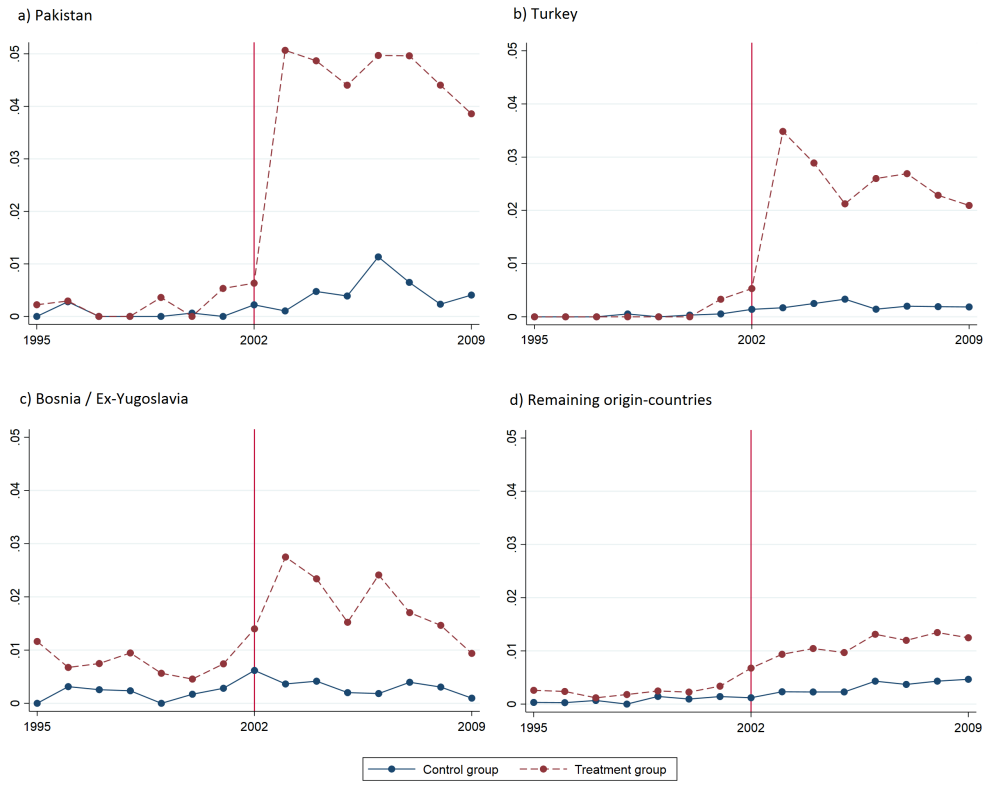
Source: Danish register data.
Notes: The treatment group are Danish citizens with immigrant background, older than 18 years, not cohabiting or married with a partner in a given year in Denmark. The control group are Danish citizens with immigrant background, older than 18 years, cohabiting or married with a non-EU citizen in a given year in Denmark.

Figure A.4 – Half-yearly emigration rates of treatment and control group to Sweden



Source: Danish register data.
Notes: The treatment group are Danish citizens with immigrant background, older than 18 years, not cohabiting or married with a partner in a given year in Denmark. The control group are Danish citizens with immigrant background, older than 18 years, cohabiting or married with a non-EU citizen in a given year in Denmark.

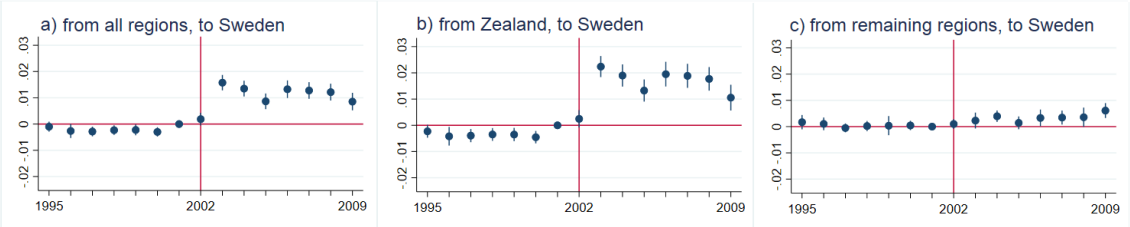
Figure A.5 – Emigration rates of treatment and control group to Sweden. Danish citizens with immigrant background from a) Pakistan, b) Turkey, c) Bosnia/Former Yugoslavia, d) remaining origin countries



Source: Danish register data.
Notes: The treatment group are Danish citizens with immigrant background, older than 18 years, not cohabiting or married with a partner in a given year in Denmark. The control group are Danish citizens with immigrant background, older than 18 years, cohabiting or married with a non-EU citizen in a given year in Denmark.

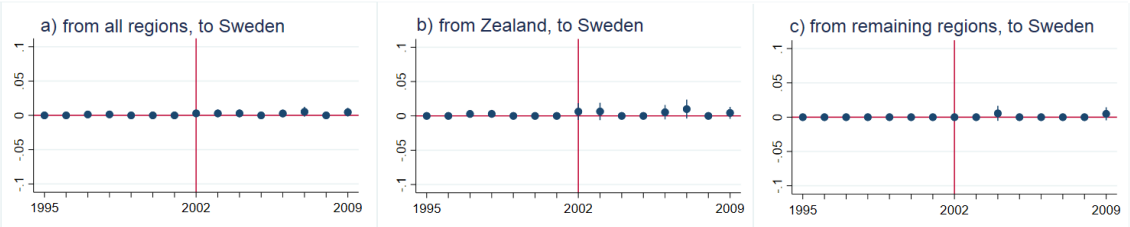
Figure A.6 – Coefficient plots for interaction effect on emigration of Danish citizens with immigrant background

(a) To Sweden, younger than 29

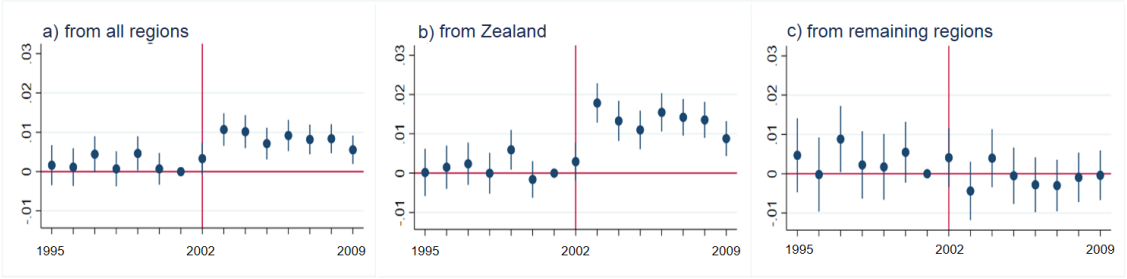


(b) To Sweden, age 29 or older

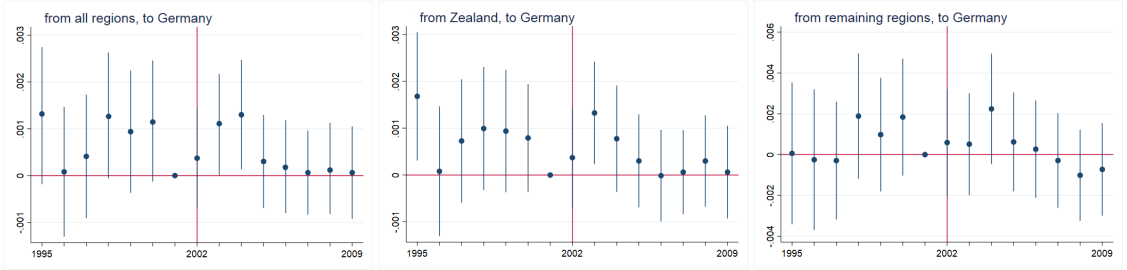
(c) To Sweden, non-EU citizens



(d) To all destinations



(e) To Germany



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 or married with a partner in a given year in Denmark. The control group are Danish citizens older than 18 years, cohabiting or married with a non-EU 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 indicate statistical significance at the 5% level. Standard errors are clustered at the individual level.

Table A.1 – Difference-in-difference regression with control variables: emigration to Sweden

	With demographic control variables			Additional socio-economic status (SES) control variables		
	All	From Zealand	From remaining regions	All	From Zealand	From remaining regions
γ_{1995}	0.0009	0.0007	0.0017*	-0.0002	-0.0007	0.0014
	(0.0008)	(0.0011)	(0.0009)	(0.0009)	(0.0012)	(0.0010)
γ_{1996}	-0.0003	-0.0010	0.0014	-0.0012	-0.0022*	0.0017
	(0.0008)	(0.0011)	(0.0009)	(0.0009)	(0.0013)	(0.0010)
γ_{1997}	-0.0014*	-0.0021**	0.0002	-0.0024***	-0.0035***	0.00000
	(0.0007)	(0.0009)	(0.0008)	(0.0008)	(0.0011)	(0.0009)
γ_{1998}	-0.0007	-0.0014	0.0010	-0.0018**	-0.0029***	0.000766
	(0.0007)	(0.0010)	(0.0008)	(0.0008)	(0.0011)	(0.0009)
γ_{1999}	-0.0007	-0.0015	0.0011	-0.0010	-0.0021*	0.0013
	(0.0008)	(0.0010)	(0.0011)	(0.0009)	(0.0011)	(0.0012)
γ_{2000}	-0.0016**	-0.0028***	0.0011	-0.0020**	-0.0034***	0.0012
	(0.0007)	(0.0010)	(0.0008)	(0.0008)	(0.0011)	(0.0010)
γ_{2001}	-	-	-	-	-	-
	-	-	-	-	-	-
γ_{2002}	0.0025***	0.0031**	0.0012	0.0026***	0.0032**	0.0013
	(0.0009)	(0.0012)	(0.0008)	(0.0010)	(0.0014)	(0.0009)
γ_{2003}	0.0126***	0.0172***	0.0029***	0.0140***	0.0188***	0.0035***
	(0.0012)	(0.0016)	(0.0010)	(0.0013)	(0.0018)	(0.0012)
γ_{2004}	0.0112***	0.0153***	0.0035***	0.0137***	0.0181***	0.0041***
	(0.0011)	(0.0016)	(0.0009)	(0.0013)	(0.0018)	(0.0012)
γ_{2005}	0.0080***	0.0111***	0.0030***	0.0091***	0.0129***	0.0021**
	(0.0010)	(0.0015)	(0.0009)	(0.0012)	(0.0017)	(0.0010)
γ_{2006}	0.0112***	0.0155***	0.0042***	0.0125***	0.0175***	0.0035***
	(0.0011)	(0.0016)	(0.0010)	(0.0013)	(0.0019)	(0.0012)
γ_{2007}	0.0098***	0.0141***	0.0030***	0.0108***	0.0158***	0.0024**
	(0.0011)	(0.0016)	(0.0009)	(0.0012)	(0.0018)	(0.0011)
γ_{2008}	0.0096***	0.0129***	0.0045***	0.0129***	0.0161***	0.0045***
	(0.0011)	(0.0015)	(0.0010)	(0.0012)	(0.0018)	(0.0011)
γ_{2009}	0.0075***	0.0095***	0.0052***	0.0115***	0.0137***	0.0046***
	(0.0010)	(0.0014)	(0.0011)	(0.0011)	(0.0016)	(0.0010)
α_1	0.0003	0.0002	0.0000	0.0009	0.0015	-0.0003
	(0.0006)	(0.0008)	(0.0005)	(0.0007)	(0.000941)	(0.0006)
α_0	0.0027***	0.0048***	0.0002	0.0009	0.0020	0.0011
	(0.0007)	(0.0010)	(0.0007)	(0.0010)	(0.0014)	(0.0010)
Demographic controls	✓	✓	✓	✓	✓	✓
SES controls				✓	✓	✓
R-squared	0.008	0.011	0.003	0.010	0.014	0.003
Observations	500,683	335,820	164,863	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 or married with a partner in a given year in Denmark. The control group are Danish citizens older than 18 years, cohabiting or married with a non-EU citizen in a given year in Denmark. Estimation with demographic controls (Columns 1-3) includes a constant and dummy variables for *year*, *age*, $female$, *children*. Estimation with socio-economic controls (Columns 4-6) additionally includes dummies for six education levels, labor force participation and unemployment. 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 A.2 – Difference in difference regression for emigration to Sweden

	Control group: Danish citizens w imm. background, cohabiting/married w non-EU partner			Alternative control group: Danish citizens w/o imm. background, not cohabiting or married		
	All	From Zealand	From remaining regions	All	From Zealand	From remaining regions
γ_{1995}	-0.0001	-0.0007	0.0012	-0.0008	-0.00167*	0.0013
	(0.00075)	(0.0010)	(0.0009)	(0.0007)	(0.0010)	(0.0009)
γ_{1996}	-0.0010	-0.0018*	0.0009	-0.0016**	-0.0026***	0.0005
	(0.0008)	(0.0011)	(0.0008)	(0.0007)	(0.0010)	(0.0008)
γ_{1997}	-0.0020***	-0.0028***	-0.0002	-0.0023***	-0.0035***	0.0003
	(0.0007)	(0.0009)	(0.0008)	(0.0006)	(0.0008)	(0.0007)
γ_{1998}	-0.0010	-0.0019**	0.0007	-0.0016**	-0.0024***	0.0004
	(0.0007)	(0.0009)	(0.0008)	(0.0006)	(0.0008)	(0.0008)
γ_{1999}	-0.0010	-0.0018*	0.0009	-0.0010	-0.0023***	0.0017**
	(0.0007)	(0.0009)	(0.0011)	(0.0006)	(0.0009)	(0.0009)
γ_{2000}	-0.0016**	-0.0027***	0.0008	-0.0020***	-0.0031***	0.0005
	(0.0008)	(0.0009)	(0.0008)	(0.0006)	(0.0008)	(0.0008)
γ_{2001}	-	-	-	-	-	-
	-	-	-	-	-	-
γ_{2002}	0.0026***	0.0033***	0.0012	0.0020**	0.0022*	0.0011
	(0.0008)	(0.0012)	(0.0008)	(0.0008)	(0.0012)	(0.0008)
γ_{2003}	0.0127***	0.0174***	0.0030***	0.0122***	0.0166***	0.0027***
	(0.0011)	(0.0015)	(0.0010)	(0.0011)	(0.0015)	(0.0010)
γ_{2004}	0.0116***	0.0158***	0.0038***	0.0117***	0.0156***	0.0034***
	(0.0011)	(0.0015)	(0.0009)	(0.0010)	(0.0015)	(0.0009)
γ_{2005}	0.0089***	0.0124***	0.0029***	0.0098***	0.0136***	0.0028***
	(0.0010)	(0.0014)	(0.0008)	(0.0009)	(0.0014)	(0.0008)
γ_{2006}	0.0120***	0.0168***	0.0041***	0.0133***	0.0185***	0.0039***
	(0.0011)	(0.0016)	(0.0009)	(0.0010)	(0.0015)	(0.0009)
γ_{2007}	0.0110***	0.0156***	0.0035***	0.0125***	0.0174***	0.0040***
	(0.0010)	(0.0015)	(0.0009)	(0.0010)	(0.0014)	(0.0008)
γ_{2008}	0.0111***	0.0151***	0.0049***	0.0127***	0.0171***	0.0053***
	(0.0010)	(0.0015)	(0.0009)	(0.0009)	(0.0014)	(0.0009)
γ_{2009}	0.0091***	0.0118***	0.0053***	0.0106***	0.0136***	0.0058***
	(0.0010)	(0.0014)	(0.0010)	(0.0009)	(0.0013)	(0.0009)
α_0	0.0027***	0.0036***	0.0007	0.0006***	0.0009***	0.0003
	(0.0005)	(0.0007)	(0.0005)	(0.0002)	(0.0003)	(0.0002)
α_1	0.0011***	0.0014***	0.0002	0.0031***	0.0042***	0.0007
	(0.0003)	(0.0004)	(0.0002)	(0.0005)	(0.0007)	(0.0004)
R-squared	0.006	0.009	0.002	0.008	0.010	0.002
Observations	500,683	335,820	164,863	11,500,211	5,009,474	6,490,737

Source: Calculations based on Danish register data.

Notes: The sample includes Danish citizens, older than 18 in a given year from 1995 to 2009. The treatment group are single individuals with immigrant background not cohabiting or married with a partner in a given year in Denmark. The control group in Columns 1-3 are individuals with immigrant background cohabiting or married with a non-EU citizen in a given year in Denmark. The control group in Columns 4-6 are Danish citizens without immigrant background, not cohabiting or married with a partner in a given year in Denmark. 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 A.3 – Descriptive statistics for duration analysis exercise

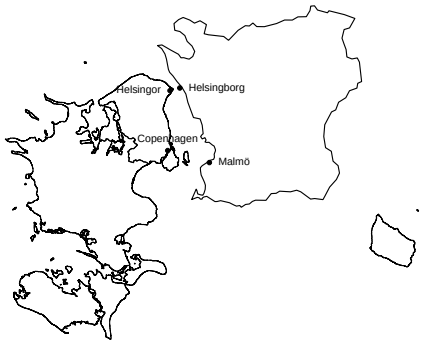
	Treatment Group	Control Group
Emigration	2,815	323
Emigration to Sweden	1,439	143
Female	42%	56%
Children	2%	63%
Zealand residents	69%	74%
Born in Denmark	48%	40%
Observations	13,292	4,130

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 or married with a partner in year 2001 in Denmark. The control group are Danish citizens older than 18 years, cohabiting or married with a non-EU citizen in 2001. All individuals must be in the data for the full observation period if they do not emigrate, i.e. until 2009.

B Additional empirical results on immigration to Sweden

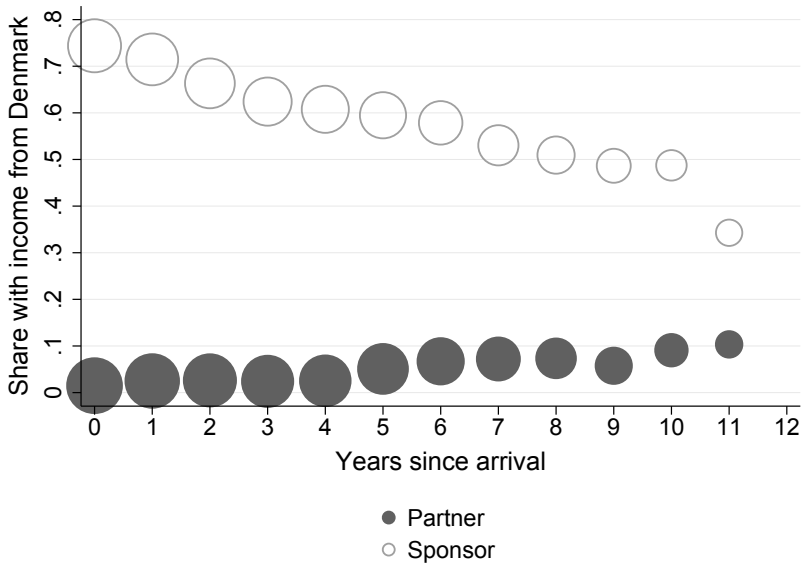
Figure B.1 – Denmark and the Øresund region

(a) Denmark and neighboring countries



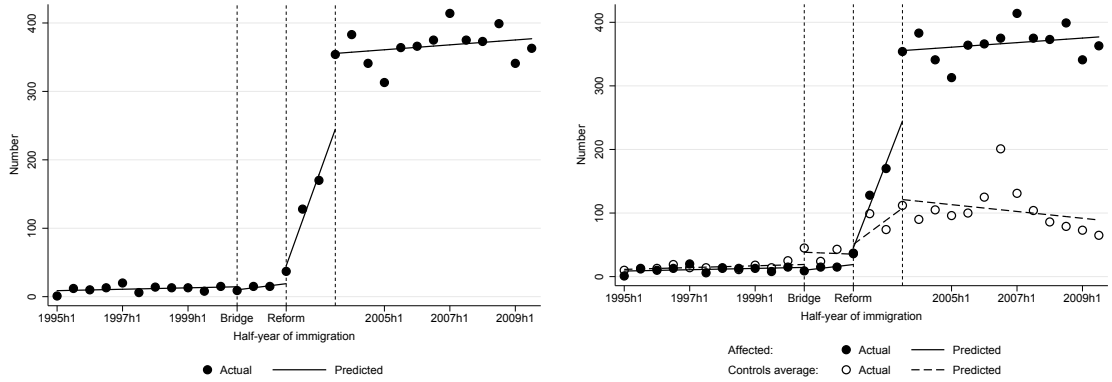
(b) Zealand, Denmark (left) and Skåne, Sweden (right)

Figure B.2 – Earnings from Denmark among the affected group arriving after the reform



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. Each circle radius is equal to the square root of the number of observations in each group, for each year since arrival.

Figure B.3 – ITSA: Adding an additional break in 2003



(a) No control group (b) With control group

Source: Calculations based on Swedish register data.
Notes: The figure displays the regression results based on equation (2). 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, 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 B.1 – Interrupted time series analysis results: no comparison group

Yearly number of partners	(1)	(2)	(3)
2002 effect	184.19	179.87	26.17
	(65.73)	(67.90)	(7.51)
Change in trend post-2002	15.55	12.95	
	(6.54)	(7.01)	
2000 effect		-4.47	-4.47
		(2.53)	(2.65)
Change in trend 2000-2002		2.48	2.48
		(0.88)	(0.92)
Change in trend 2002-2003			63.50
			(7.00)
2003 effect			110.82
			(19.98)
Change in trend post-2003			-64.71
			(7.03)
Number of observations	30	30	30

Notes: The dependent variable is given by the half-yearly number of treated individuals moving to Sweden. Column (1) reports results from the baseline regression in equation 2. In column (2) we add an additional break in 2000 to capture the effect of the opening of the Øresund bridge. Column (3) adds an additional break in 2003 to capture lags in individuals' reaction to the reform.

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

	(1)	(2)	(3)
Baseline mean level difference	3.70	-2.45	-2.45
	(4.23)	(3.81)	(3.98)
Baseline mean trend difference	-1.56	-0.18	-0.18
	(0.53)	(0.54)	(0.56)
2002 effect	125.44	122.07	10.83
	(68.11)	(71.76)	(23.47)
Change in trend post-2002	16.80	11.24	
	(6.86)	(8.75)	
2000 effect		-23.70	-23.70
		(6.07)	(6.34)
Change in trend 2000-2002		4.18	4.18
		(5.47)	(5.71)
Change in trend 2002-2003			43.50
			(13.88)
2003 effect			97.27
			(35.70)
Change in trend post-2003			-43.03
			(14.26)
Number of observations	60	60	60

Notes: The dependent variable is given by the half-yearly number of treated individuals moving to Sweden. Column (1) reports results from the regression in equation 3. In column (2) we add an additional break in 2000 to capture the effect of the opening of the Øresund bridge. Column (3) adds an additional break in 2003 to capture lags in individuals' reaction to the reform.

Table B.3 – Interrupted time series analysis results: with FI-NO comparison group

	(1)	(2)
Baseline mean level difference	-7.08	-7.08
	(3.96)	(4.12)
Baseline mean trend difference	-1.58	-1.58
	(0.48)	(0.50)
2002 effect	191.54	25.61
	(66.06)	(9.08)
Change in trend post-2002	17.17	
	(6.59)	
Change in trend 2002-2003		75.08
		(6.47)
2003 effect		106.41
		(20.94)
Change in trend post-2003		-72.79
		(6.83)
Number of observations	60	60

Notes: The dependent variable is given by the half-yearly number of treated individuals moving to Sweden. Column (1) reports results from the regression in equation 3. In column (2) we add an additional break in 2003 to capture lags in individuals' reaction to the reform.