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ABSTRACT

We study the effects of welfare generosity on international migration using a series of large changes in welfare benefits for immigrants in Denmark. The first change, implemented in 2002, lowered benefits for immigrants from outside the EU by about 50%, with no changes for natives or immigrants from inside the EU. The policy was later repealed and re-introduced. The differential treatment of immigrants from inside and outside the EU, and of different types of non-EU immigrants, allows for a quasi-experimental research design. We find sizeable effects: the benefit reduction reduced the net flow of immigrants by about 5,000 people per year, or 3.7 percent of the stock of treated immigrants, and the subsequent repeal of the policy reversed the effect almost exactly. Our study provides some of the first causal evidence on the widely debated "welfare magnet" hypothesis. While there are many non-welfare factors that matter for migration decisions, our evidence implies that, conditional on moving, the generosity of the welfare system is important for destination choices.

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1 Introduction

Do generous welfare benefits act as magnets for low-skilled immigrants? This is a classic debate among economists and policy makers, but there is virtually no evidence on the question. The existing literature provides correlational evidence consistent with the welfare magnet hypothesis. For example, Borjas (1999) shows that immigrant welfare recipients in the U.S. tend to be clustered in high-benefit states, while Boeri (2010) shows that low-skilled immigrants in the EU are more likely to locate in high-benefit countries. These patterns are suggestive, but it remains an open question if they reflect a causal relationship or if they are driven by confounding factors correlated with benefit levels. To obtain casual evidence, we need variation in welfare benefits that is plausibly orthogonal to other factors driving location choices.

We argue that Denmark provides an ideal setting for studying this question. First, Denmark has one of the most generous welfare systems in the world — benefit rates are even higher than in the other Nordic welfare states — making it a potential welfare magnet. Second, motivated by welfare magnet concerns and general anti-immigration sentiments, Denmark has experimented with immigrant welfare schemes that sharply reduce benefits to certain foreign immigrants. In June 2002, shortly after the formation of a new government supported by a far-right, anti-immigration party, Denmark introduced a welfare scheme that reduced benefits by up to 50% for immigrants from outside the EU.[1] The welfare scheme was controversial and widely debated. It was repealed in 2012 following the election of a center-left government, and then reinstituted in 2015 after the return of a center-right government.

The Danish government has been active in disseminating information about the welfare scheme to potential immigrants. For example, around the reinstitution of the scheme in 2015, the government ran an ad campaign in Lebanese newspapers informing refugees of the reduced benefits.[2] These ads, illustrated in Figure A.I, highlight the 50% benefit reduction at the top and suggest that the scheme was motivated largely by a desire to reduce the inflow of refugees.

To study the impact of the welfare scheme on migration flows, we consider two difference-in-differences strategies. The first strategy is a *within-country* approach based on comparing im-

[1] To be precise, the scheme applied to immigrants from outside the EU *and* the four member countries of the European Free Trade Association (EFTA), namely Iceland, Liechtenstein, Norway, and Switzerland.

[2] Lebanon hosts a number of large refugee camps and provides a common transit for Middle Eastern refugees headed to Europe.

migration flows to Denmark from outside the EU (treatments) and from inside the EU (controls) around the three reforms.[3] The findings are striking: The immigration flows of the two groups evolve in parallel during the twenty years leading up to the 2002 reform, diverge sharply after the introduction of the immigrant welfare scheme in 2002, converge again following the repeal of the scheme in 2012, and diverge once more when the scheme is reintroduced in 2015. We find that the scheme reduced the net flow of immigrants by almost 5,000 people per year, corresponding to 3.7 percent of the stock of treated immigrants. The second strategy is a *cross-country* approach based on comparing non-EU immigration flows in Denmark and a synthetic control country constructed from the other Nordic countries. Consistent with the within-country approach, the cross-country approach features large and sharp migration effects around each of the three reforms.

To further underpin our interpretation of the data, we decompose the immigration effects by type of residence permit: asylum permits, family permits, and work/study permits. Only those coming on asylum or through family relations are treated by the welfare cuts. Consistent with this, we show that the effects are driven entirely by asylum- and family-based immigration; the effect on those coming for work or study is a precisely estimated zero. This implies that our estimates are not biased by time-varying unobservables that affect all non-EU immigrants relative to EU immigrants. Any threat to identification must come from time-varying unobservables that vary both by region of origin (EU vs. non-EU) and by immigrant type within region (asylum/family vs. work/study).

It is worth highlighting two points on interpretation. First, the effects should be interpreted as capturing location decisions *conditional on migration*. Since Denmark is just one small country, we would not expect the decision to emigrate from, say, Afghanistan to be affected by the Danish welfare system. Rather, it is the decision by an Afghan migrant to locate in Denmark instead of, say, Sweden or Germany that is affected by the Danish welfare system. Second, the presence of sizeable welfare magnet effects may make it tempting for governments to introduce immigrant welfare schemes like the Danish one, and in fact several countries have introduced or are discussing the introduction of related policies.[4] However, such policies impose negative fiscal externalities on other countries and are, in general, not socially optimal from a global perspective. This tension

[3] To avoid confounding effects of the EU enlargements in the post-reform period, coming from "inside the EU" is defined based on the member countries in the pre-reform year, 2001.

[4] In the U.S., the welfare reform act of 1996 (PRWORA) denied non-citizens eligibility for welfare benefits. Special immigrant welfare schemes have also been passed in Canada (in 2014) and Germany (in 2016). Countries where such welfare schemes have been proposed, but not yet implemented, include Austria, Finland, France, Latvia, Lithuania, The Netherlands, and Switzerland.

between local and global welfare when setting benefits for low-income immigrants is analogous to the tension that arises when setting taxes for high-income immigrants (see Kleven, Landais, Muñoz, and Stantcheva 2019). Our findings suggest that the issues surrounding tax competition and the risk of a "race to the bottom" may be equally relevant for welfare policy.

Our paper contributes to an empirical literature estimating welfare magnet effects, for example Blank (1988), Borjas (1999), Dodson (2001), Kaushal (2005), De Giorgi and Pellizzari (2009), Boeri (2010), and Razin and Wahba (2015). Much of the literature has focused on migration responses to state-level variation in welfare benefits in the U.S., but the estimates vary greatly across studies and no consensus has been reached. Our main contribution is to provide the first quasi-experimental evidence on the existence of welfare magnet effects, and to show that these effects can be sizeable. The welfare scheme that we use for identification has been studied in two existing papers (Rosholm and Vejlin 2010; Andersen, Dustmann, and Landersø 2019), but they focus on a different question: the impact of lowering welfare benefits on immigrant outcomes (such as employment, earnings, crime, and children) conditional on locating in Denmark. Finally, while we are interested in the effects of welfare benefits on immigration, there is a recent literature studying what is essentially the reverse of our question: the effect of immigration on preferences for redistribution and voting outcomes (Alesina, Miano, and Stantcheva 2018; Alesina, Murard, and Rapoport 2019; Dustmann, Vasiljeva, and Damm 2019). The introduction of a special immigrant welfare scheme in Denmark provides *prima facie* evidence that immigration may shape redistributive preferences and policy. Importantly, our quasi-experimental approach — relying on sharp changes in treatment relative to control groups after the scheme introduction — will not be confounded by such reverse causation channels.

The rest of the paper is organized as follows. Section 2 describes the policy experiment and data, section 3 presents our results on welfare magnet effects, while section 4 concludes.

2 Policy Experiment and Data

2.1 Policy Experiment

Our empirical analysis uses the immigrant welfare scheme in Denmark as a quasi-experiment for studying welfare magnet effects. The scheme was passed in parliament in June 2002 and applies to immigrants arriving after July 1, 2002. Only immigrants coming from outside the EU and the four EFTA countries (Iceland, Liechtenstein, Norway, and Switzerland) are subject to the scheme. For

simplicity, we will refer to treated immigrants as coming from "outside the EU". Under the scheme rules, welfare benefits are much lower than the standard, native benefit rate. The largest cut applies to married couples with children for whom the maximum cash benefit is reduced by 50% due to the scheme. For other family types, the benefit drop is somewhat lower. In order for immigrants on scheme benefits to transition to the higher native benefits, they have to stay in Denmark for at least 7 years. The scheme was repealed in January 2012 and subsequently reintroduced with minor changes in August 2015.

These benefit changes are illustrated in Figure A.II. The figure shows the maximum monthly benefits in Denmark for scheme immigrants and for natives or non-scheme immigrants, distinguishing between different family types. The figure also shows monthly benefits in the other Nordic countries: Sweden, Norway, and Finland. Only means-tested *cash* welfare is included here. Immigrants may be eligible for other forms of social assistance such as means-tested housing benefits, which are not covered by the scheme. The following points are worth highlighting. First, while benefits for scheme immigrants vary greatly over time due to the introduction, repeal and reintroduction of the scheme, benefits for natives and non-scheme immigrants in Denmark and for residents of the other Nordic countries are smooth over time. This variation forms the basis of our difference-in-differences designs: (i) a within-country strategy comparing immigration from outside the EU to immigration from inside the EU into Denmark, and (ii) a cross-country strategy comparing non-EU immigration in Denmark to non-EU immigration in the other Nordic countries.[5] Second, welfare benefits are higher in Denmark than in the other countries *even under the scheme rules*. This is partly because the figure does not include housing benefits, which are higher in the other countries than in Denmark. Still, even including housing support, welfare benefits for Danish scheme immigrants are similar to benefits in the comparison countries. The generous benefits in Denmark make it a natural welfare magnet and are part of the political motivation for the scheme.[6]

A potential issue with studying the 2002 scheme introduction is that two other regulatory changes were implemented at the same time. These changes affected migrants seeking Danish residency through marriage with an existing Danish resident. One legislative change was the in-

[5]To avoid confounding effects of the EU enlargements in the post-reform period, coming from "inside the EU" is defined based on the member countries in the pre-reform year, 2001.

[6]Importantly, this does not invalidate the experiment in the sense that Denmark dominates the other countries in terms of welfare generosity. With idiosyncratic variation in non-welfare preferences for location, there will still be immigrants close to the indifference margin between Denmark and alternative countries. It is these marginal immigrants that may respond to the scheme by changing their destination country.

troduction of the "24-Year Rule" according to which, in order to obtain marriage-based residency, both spouses must be at least 24 years of age. To avoid any confounding effects of the 24-Year Rule, our main specification restricts the sample to immigrants at least 30 years of age.[7] The other legislative change involved a stricter assessment of marriage-based residence applications even for couples who satisfy the 24-Year Rule. This change applied specifically to the assessment of marriages between a Danish citizen and a foreign immigrant. While previously such residence applications had been virtually guaranteed to be accepted, the government introduced the possibility of rejecting them based on a range of criteria. In practice, this piece of legislation likely had a relatively limited impact on migration flows. Nevertheless, we have two ways of checking that our results are not contaminated by this regulatory change. We investigate heterogeneity across different types of residence permits using the fact that asylum-seekers are unaffected by the changes to family permits, and we exploit that the two later welfare scheme reforms (in 2012 and 2015) changed benefits without changing regulation.

2.2 Data

The analysis is based on administrative data from Denmark covering the full population from 1980 to 2017. We combine several administrative registers, linked at the individual level, to get information about immigrant status, country of origin, type of residence permit, and demographic characteristics. We are also able to link family members, which is important for correctly calculating welfare benefits.

As described, our empirical strategy exploits that the immigrant welfare scheme applies only to arrivals from outside the EU and EFTA. We define our treatment group as all first-generation (i.e., foreign-born) immigrants with a country of origin outside the EU and EFTA. We define our control group as all first-generation immigrants with a country of origin inside the EU or EFTA, where EU is defined based on 2001 membership. We restrict our sample to individuals who are at least 30 years old to avoid any confounding effects of the 24-Year Rule discussed above. We also drop immigrants from Bosnia-Herzegovina, because they generate a massive spike in the pre-trend due to the Bosnian War and a special Danish law for Bosnian refugees passed in 1995 (see below). These restrictions leave us with a sample of 6,738,446 individual-year observations.[8]

[7] The reason for not cutting the sample exactly at age 24 is the possibility of intertemporal substitution around the age cutoff, i.e. spouses below the age of 24 who postpone moving to Denmark until they have turned 24. We will investigate the robustness of our results to different age cutoffs.

[8] For the cross-country strategy in which we compare Denmark to other Nordic countries, we combine data from the

2.3 Migration Patterns

Denmark has seen a strong upward trend in the number of immigrants over the last four decades. The share of first-generation immigrants in the population has increased from 3% in 1980 to over 10% in 2017.[9] As a result, Denmark now has a foreign-born population share almost as high as the U.S. (13.5%).[10] Immigrants from non-EU countries — those targeted by the welfare scheme — constitute the largest group: they accounted for 67% of all first-generation immigrants in 2001, the year before the scheme was introduced.

Figure 1 shows annual migration flows from outside the EU since 1980, in aggregate and from specific countries. Panel A shows that — apart from sharp spikes in 1995 and 2015 — the net flow of non-EU immigration has averaged about 8,000 people per year. A large part of the aggregate flow come from a relatively limited set of countries, illustrated in Panel A by the series for the eight main sending countries.[11]

To understand these flows better, Panel B considers each of the eight main sending countries separately. The most striking feature of the graph is the presence of sharp spikes in 1995 and 2015, which reflect immigration from Bosnia-Herzegovina and Syria, respectively. The Bosnia spike in 1995 is driven by the Bosnian War of 1992-95 combined with a special Danish law that granted Bosnian refugees permanent residence in Denmark. Since this supply shock occurred well before the first welfare scheme reform, it does not pose a threat to identification. It does create a large spike in the pre-trend for the treatment group, however, and to avoid this we drop immigrants from Bosnia-Herzegovina in all years. The Syria spike around 2015 is driven by the Syrian Civil War. This supply shock does pose a threat to our strategy, because it coincides with the reintroduction of the welfare scheme in 2015. While some of this spike may be interpreted as a confounding supply shock that creates excess migration to Denmark, some of it may also reflect that, conditional on leaving Syria, the choice between Denmark and alternative countries reflects the Danish welfare system. It is not *a priori* clear if any bias from the Syrian refugee crisis will be upward or downward since the excess migration happens on both sides of the scheme reintroduction (in both high- and low-benefit environments). We do two main things to address any concerns about bias from the Syrian supply shock: (i) we run all estimations on a sample

national statistics bureau of each country with OECD's International Migration Database over the period 1991-2017.

[9] See Figure A.III.

[10] OECD, International Migration Outlook 2019.

[11] These eight countries (Afghanistan, Bosnia, Iran, Iraq, Lebanon, Somalia, Syria, and Turkey) are defined as the non-EU countries featuring the largest average net flow of immigrants to Denmark between 1980-2017.

where Syrians are dropped throughout, and (ii) we carry out a cross-country analysis in which we compare Denmark to other Nordic countries, which were also treated by the Syrian supply shock but did not implement any welfare reforms. We show that our results are robust to both of these alternative strategies.

3 Is There a Welfare Magnet Effect?

3.1 Within-Country Strategy

Figure 2 presents our main results graphically. Panel A shows the net immigration flow from outside the EU between 1980 and 2017, along with a linear trend estimated using pre-scheme data between 1980 and 2001. The time series evidence is striking. Immigration follows a linear trend in the two decades prior to the welfare scheme, diverges sharply from trend after the introduction of the scheme in 2002, catches up with the trend following the repeal of the scheme in 2012, and diverges once more when the scheme is reintroduced in 2015. When the scheme is first introduced, immigration falls for four years before reaching a steady state relative to the linear trend. When the scheme is repealed, it takes exactly four years for immigration to catch back up with the trend. The sharp changes around each of the three reforms and the great degree of symmetry across reforms provide strongly suggestive evidence of a welfare magnet channel.

Of course, the time series evidence could be biased by non-welfare determinants of migration that change over time. We therefore exploit that the scheme rules apply only to non-EU immigrants, which allows us to compare treated and untreated immigrants in a difference-in-differences (DiD) framework. The results are presented in Panel B, in which we compare net immigration flows from outside the EU (treatments) and inside the EU (controls) over time. Because the two groups trend differently in the raw data, the plotted series have been de-trended by subtracting a linear trend estimated on pre-scheme data. That is, the non-EU immigration series represent the residuals between the actual flow and the predicted flow shown in Panel A, and likewise for the EU immigration series.

The patterns in Panel B are compelling and consistent with the time series evidence in Panel A. The treatment and control series evolve in parallel for a long period prior to the scheme, diverge sharply after the introduction of the scheme, converge when the scheme is repealed, and diverge once more when it is reintroduced. Again, there is a striking degree of symmetry across the different reforms: it takes four years for the full effect of the scheme introduction to materialize, and it

takes exactly four years for the scheme repeal to reverse that effect. Moreover, when the scheme is reintroduced in 2015, the impact during the two years for which we have data is similar to the two-year impacts around the other reforms. The graph suggests that, at full impact, the welfare scheme reduced non-EU immigration by about 5,000 people per year, or 3.7 percent of the pre-reform stock of non-EU immigrants in Denmark.

Although the DiD evidence looks compelling, identification could still be compromised by the presence of time-varying immigration factors that vary by country of origin (EU vs. non-EU). As discussed in section 2.1, this concern is particularly relevant for the 2002 scheme introduction as it coincided with regulatory changes to the assessment of marriage-based residence applications. The first of these changes — the so-called 24-Year Rule — is not a confounder here, because the figure restricts attention to immigrants aged 30 and above. The other change — a tightening of the criteria for marriage-based immigration — is not controlled for in the graph. The symmetry of the DiD effects across reforms is particularly informative in this light. The later scheme reforms did not coincide with such regulatory changes, but produced similar effects.

To investigate the threat from time-varying unobservables more broadly, we exploit that our data include information about residence permits. This allows us to check if the changes around each reform are driven by the types of immigrants who are treated by the welfare scheme. Specifically, there are four main types of residence permits: asylum, family, work, and study. Those coming on asylum and family permits are eligible for welfare benefits and therefore treated by the scheme, while those coming for work or study are ineligible for welfare benefits and therefore untreated. Figure 3 shows immigration flows for the different types of residence permits between 1997-2017, relative to a linear pre-trend.[12] The figure shows that the effects on non-EU immigration are driven entirely by those on asylum and family permits; if anything, immigration by those on work and study permits accelerates following the introduction of the scheme. Furthermore, the figure shows that asylum-based immigration responds somewhat more strongly than family-based immigration. This is natural: most newly-arrived refugees have very limited job opportunities and therefore no alternative to welfare benefits, making the scheme treatment particularly severe for them.[13] The fact that asylum-based permits change more strongly than family permits also

[12]The figure restricts attention to the period 1997-2017, because the residence permit data is available only from 1997 onwards. The linear and group-specific pre-trends (with which we residualize each series) have been estimated using data from 1997-2001.

[13]When the scheme was introduced in 2002, the employment rate for refugees was about 10% after one year in Denmark, 19% after two years, and 32% after 3-5 years (Andersen, Dustmann, and Landersø 2019). As a result, welfare benefits is the primary source of income for almost all refugees in the first years after arrival.

alleviates any remaining concerns regarding the confounding effects of regulatory changes to the assessment of family permits.

One type of confounding shock remains a concern, however: exogenous supply shocks driven by war, political unrest, and the like. In practice such shocks affect only asylum-based, non-EU immigration. If these shocks coincide with the scheme reforms, changes in non-EU immigration by those coming on asylum (relative to family, work or study permits) may reflect non-welfare factors in the sending countries. As described previously, the main supply shock during the post-scheme period is the Syrian refugee crisis around 2014-16. Indeed, Figure 3 shows a spike in asylum-based permits relative to other permits during these years. While it is not *a priori* clear that this variation creates bias — in part because the Syrian refugee spike happens on both sides of the scheme reintroduction in 2015 — it does represent a cause for concern. In the next section we investigate this issue by comparing Denmark to similar countries that were also affected by the Syrian supply shock. In this section, we consider a more basic robustness check: dropping Syrian immigrants from the sample throughout. We come back to this below.

To formally estimate the effect of welfare benefits on immigration flows, we collapse the micro data to the level of welfare benefit groups. These groups are defined as those relevant for benefit eligibility (see Figure A.II): married and unmarried individuals with different numbers of children (0, 1, 2+) coming from outside or inside the EU, a total of 12 different benefit groups. We then run the following DiD regression specification:

$$Y_{gt} = \beta B_{gt} + \gamma_g + \eta_t + \nu_{gt}, \tag{1}$$

where Y_{gt} is the net immigration flow for group g in year t, scaled by the pre-reform immigrant stock for the group, B_{gt} is the maximum monthly benefit for a given group and year, γ_g is a group fixed effect, and η_t is a year fixed effect. To make interpretation easier, we convert the benefit amounts into US Dollars (measured in 100s), so that the DiD coefficient β captures the impact on immigration from raising monthly benefits by 100 Dollars.[14] Notice that equation (1) is based on richer benefit variation than in the graphical analysis. The estimation of β exploits that the benefit changes for non-EU immigrants (relative to EU immigrants) differ across families depending on marital status and the number of children.

As discussed above, immigration flows trend upwards over time, and these non-welfare trends

[14] We use the DKK-USD exchange rate of December 31, 2018. In the scheme reform years, we use average benefits over the year based on the month in which the reform was implemented.

differ across treatment and control groups. The DiD graphs were therefore adjusted for linear and group-specific pre-trends. Consistent with this, the regression analysis will also be based on detrended data. Specifically, the outcome variable Y_{gt} is the net immigration flow (scaled by the stock) residualized by a linear, group-specific trend estimated on the pre-scheme data (1980-2001).

The results are presented in Table 1. Panel A shows estimates of the effect on net immigration flow (inflow minus outflow), while Panel B focuses on the inflow alone and breaks the effect down by type of residence permit. The different columns show different sample restrictions in terms of age and whether Syrian immigrants are included or not. Our baseline specification in (1) considers immigrants above age 30 and includes Syrian immigrants, corresponding to the analysis in Figure 2. In this specification, we find that the immigration net flow increases by 0.44% of the stock for each $100 increase in benefits. The immigrant welfare scheme reduced benefits by up to $800 (for married couples with children), implying a total effect on immigration equal to 3.5% of the stock.[15] Reading across the different columns, we see that the estimates are very robust to alternative age cutoffs and to dropping Syrian immigrants. As discussed above, it was *a priori* unclear in which direction Syrian immigration affects the estimates, because the 2014-16 spike falls on both the low- and high-benefit side of the 2015 scheme reform. The results in the table show that Syrian immigrants have a downward, though small, effect on our estimates.

Turning to the effects on gross inflow and its composition in Panel B, the following insights are worth highlighting. First, the total effect on inflow equals 0.37% of the stock per $100 dollar of benefits in the baseline specification. This represents 84% of the net immigration effect shown in Panel A, i.e. almost all of the effect is driven by reduced inflow rather than by increased outflow. Second, the inflow effect is driven entirely by asylum- and family-related migration, with somewhat larger effects on the former. The effect on work- and study-related migration is a precisely estimated zero across all specifications. As discussed, this is critical for the credibility of our results since immigrants coming on work and study permits are untreated by welfare reform. Our results imply that any threat to identification must come from time-varying unobservables that vary both by country of region (EU vs non-EU) and by immigrant type within region (asylum/family vs work/study). Third, the results are robust to changing the age cutoff and dropping Syrian immigrants. As we lower the age cutoff to 24 or 18 years, the estimated effect on family-based immigration does increase a little bit, likely reflecting the confounding effects of the 24-Year Rule which motivated the

[15] This is roughly consistent with the results in Panel B of Figure 2. There we see a drop in immigration of about 5,000 people (at full impact), corresponding to 3.7% of the 2001 stock of non-EU immigrants.

30-year sample restriction.

To summarize, the within-country DiD analysis reveals large and strongly significant welfare magnet effects. The effects of the scheme reforms are sharp and driven by changes in the inflow of immigrants coming on asylum or family permits, precisely those treated by the scheme. The natural interpretation of these effects is that they represent choice of destination country, conditional on migrating. Because new arrivals in Denmark, particularly refugees, have extremely limited employment opportunities for a period of time, it is natural that they are responsive to the drastic welfare cuts implied by the Danish scheme.

3.2 Cross-Country Strategy

As we have discussed, a potential identification concern is the presence of push factors such as war, famine, and economic crises, which increase immigration and could be correlated in time with the Danish policy experiments. The within-country approach relying on changes in non-EU (relative to EU) immigration driven by asylum and family permits (relative to work and study permits) is not immune to this concern, because the confounding push factors apply specifically to non-EU, asylum-based immigration. The sharpness of the time changes around each of the three reforms and the fact that the effects are observed also for those coming on family permits make it very unlikely that the effects are driven entirely or mostly by confounding supply shocks, but we cannot rule out some bias in the within-country analysis.

The main supply shock during the post-scheme period is the Syrian Civil War, which caused a massive influx of refugees to Europe between 2014-16, i.e. around the time of the reintroduction of the Danish welfare scheme. We have shown that our results are robust to dropping Syrian immigrants from the sample, but this strategy may not be without bias if Syrian refugees choose Denmark partly based on welfare generosity. That is, including Syrian immigrants may attribute confounding push factors to welfare benefits, while excluding Syrian immigrants may leave out welfare-driven immigration. The natural way to deal with the threat posed by such factors is a cross-country strategy: comparing Denmark to countries that experienced the same supply shocks, but did not change welfare benefits.

This motivates the analysis in this section in which we draw on additional data from three other Nordic countries: Norway, Sweden, and Finland. We focus on the Nordic countries because they are culturally and economically similar and therefore more likely to be affected by confounding supply shocks in the same way. We use the synthetic control approach developed by Abadie,

Diamond, and Hainmueller (2010) to construct a "synthetic Denmark," a weighted average of the other countries. To construct the weights, we match on annual migration flows from outside the EU during the pre-reform period, 1991-2001. More precisely, because migration flows differ in absolute levels due to differences in country size, we match on non-EU migration flows normalized by the pre-reform stock of non-EU migrants in each country. The resulting weights are 47% on Finland, 37% on Norway, and 17% on Sweden.

Our results are presented in Figure 4. Panel A of the figure shows raw immigration flows from outside the EU in each of the four countries.[16] We see that the migration flows evolve similarly in the four countries throughout the pre-reform period, 1991-2001, lending support to the parallel trends assumption. Starting in 2002, immediately following the introduction of the Danish welfare scheme, migration to Denmark begins to decline while the three other countries continue their upward trend. Migration flows to Denmark settle at a much lower level until the repeal of the Danish welfare scheme starting in 2012, after which Denmark rapidly catches up with the other three countries. After the reintroduction of the welfare scheme in 2015, we again see flows to Denmark declining compared to its Nordic neighbors.

Panel B of the figure presents findings from the synthetic control approach. The immigration flows in Denmark and the synthetic control country match closely during the pre-reform years, and the patterns around the scheme reforms are consistent with what we saw in the within-country analysis: Relative to the control country, migration to Denmark declines after the initial reform in 2002, catches up after the repeal in 2012, and again drops following the reintroduction in 2015. This evidence alleviates concerns that the Syrian refugee crisis biases our estimates: the other Nordic countries are exposed to the same supply shock, but experience a different timing in their immigration spike. Syrian immigration in Denmark spikes in 2014-15 — before the reintroduction of lower benefits — while it remains flat in synthetic Denmark during these years and only starts spiking in 2016. In fact, Panel A shows that the 2016 spike happens in every Nordic country except Denmark. This is consistent with a model in which refugees choose where to seek asylum based in part on benefit levels, and where the reduction in Danish welfare benefits causes some Syrian migrants to forgo Denmark in favor of other destination countries.

The findings in Figure 4, taken at face value, imply that Denmark's welfare scheme had a

[16] We note two limitations of the cross-country data. First, because we are unable to restrict migration by age for the other Nordic countries, the analysis in this section includes migrants at all ages. As a result, the patterns around the 2002 reform may be influenced by the 24-Year Rule. Second, to eliminate the pre-reform Bosnia shock in a consistent way across countries, we have to exclude migrants from all countries of the former Yugoslavia.

considerably larger effect on immigration than estimated from the within-country approach. Note, however, that since we are unable to restrict the sample by age in the cross-country analysis, the response also captures any effect of the 24-Year Rule around the initial 2002 reform.[17] Additionally, if the other Nordic countries serve as substitutes for migrants who would have chosen Denmark absent the welfare scheme, the synthetic control series will overstate the true counterfactual level of migration to Denmark. In fact, if migrants' only alternatives to Denmark were the other Nordic countries, the effect in Figure 4 would be doubled relative to the true causal effect: Any migrant who avoids Denmark due to welfare reform would instead appear in the control group and thus be counted twice. Of course, migrants do have options outside the Nordics, and so we expect this source of bias to be more modest. Nevertheless, while the cross-country analysis provides clear evidence of a welfare magnet effect, and seems to rule out that our within-country results are driven by confounding supply shocks coinciding with the Danish reforms, we caution against attaching too much importance to the specific magnitudes found here. Our estimates from the previous section are better measures of the magnitude of the welfare magnet effect.

4 Conclusion

We have provided some of the first causal evidence on welfare magnet effects: A Danish welfare scheme that cut benefits by up to 50% for non-EU immigrants had large and sharp effects on immigration flows. While these effects may be consistent with the political objective of the scheme, it is worth asking if such policies are also socially optimal? This depends on whether we take a local or global perspective. As a first approximation, the allocation of immigrants across countries is a zero-sum game. From a local perspective, governments may have an incentive to deter low-skilled immigrants (who collect benefits) and at the same time encourage high-skilled immigrants (who pay taxes). Cutting immigrant benefits can therefore be optimal for individual countries, taking other countries' policies as given. But such policies are not globally optimal: The migrants who avoid Denmark due to the welfare scheme will end up in other destination countries, imposing fiscal externalities on them. In the extreme, this may create a race-to-the-bottom in benefit setting, similar to the race-to-the-bottom discussed in the context of tax setting (Kleven, Landais, Muñoz, and Stantcheva 2019). International policy coordination could avoid such effects.

[17] The 24-Year Rule has remained in place since 2002, so it is not a confounder around the two later reforms.

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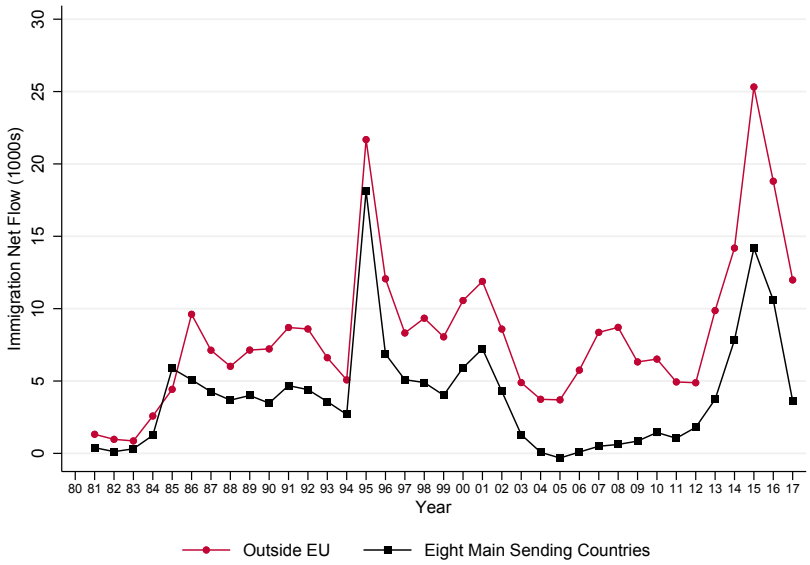
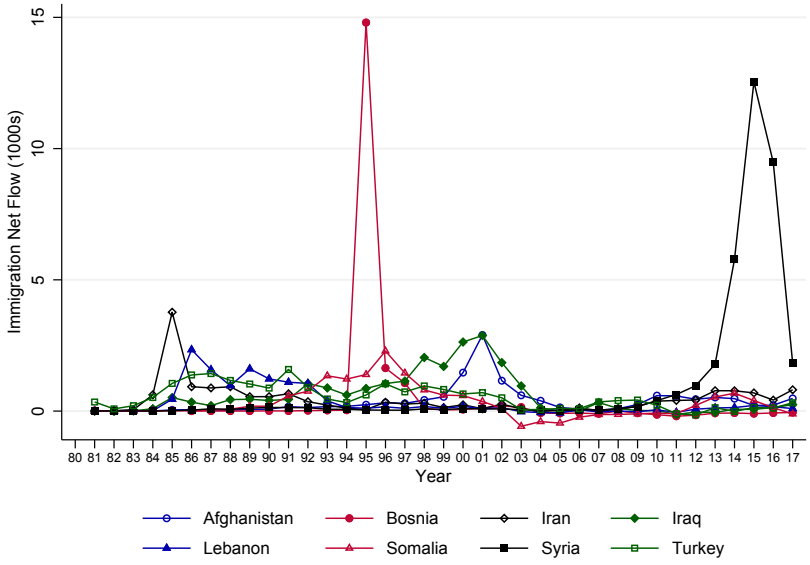
Figure 1: Migration Flows 1980-2017

A: Immigration from Outside EU



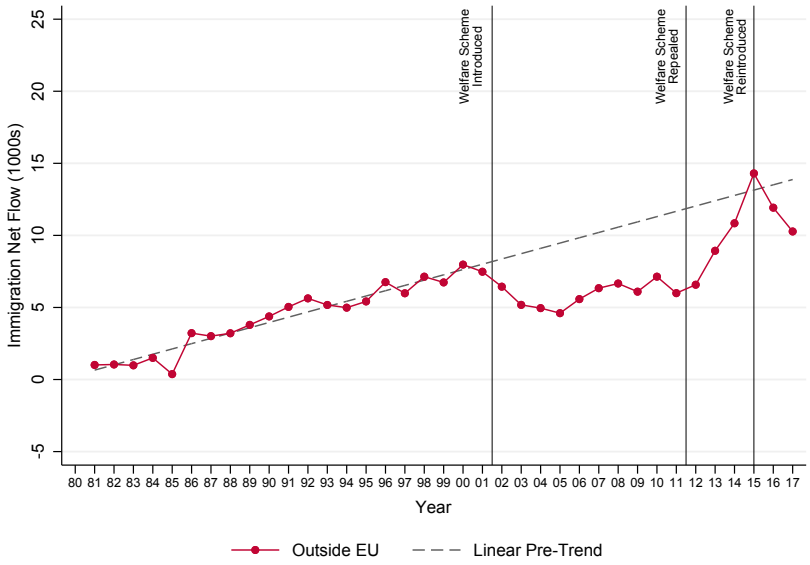
B: Immigration from Main Sending Countries



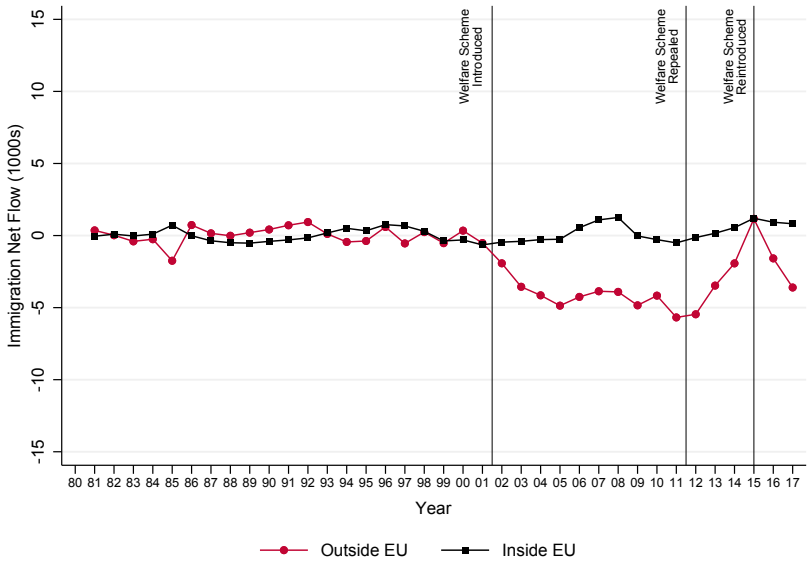
Notes: Panel A shows the net flow of immigrants in Denmark from all countries outside the EU/EFTA as well as from the eight main sending countries outside the EU/EFTA. The main sending countries are defined as those with the highest average annual net flow of immigrants over the years 1980-2017. Panel B shows the net flow of immigrants from each of the eight main sending countries separately. The annual net flow of immigrants is measured as the year-to-year change in the stock of immigrants.

Figure 2: Migration Responses to the Immigrant Welfare Scheme

A: Immigration from Outside EU

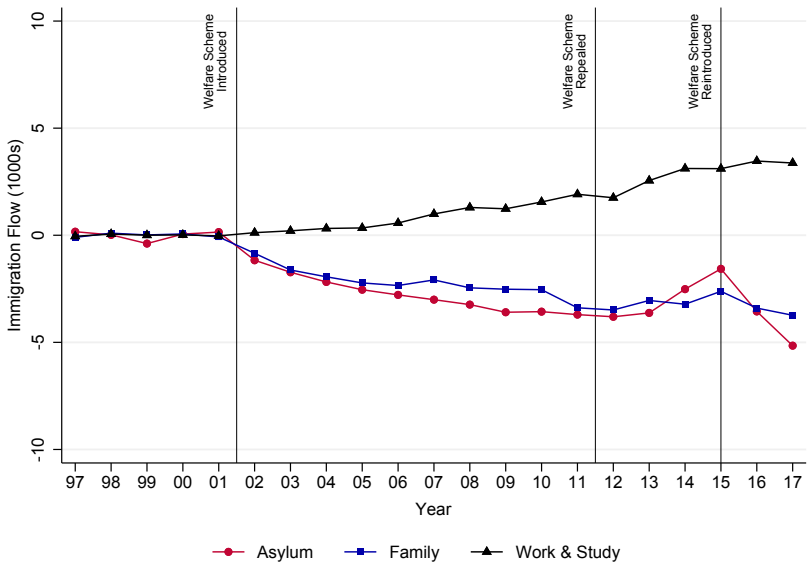


B: Immigration from Outside EU vs Inside EU (De-trended)



Notes: Panel A shows the net flow of immigrants in Denmark from outside the EU/EFTA over the period 1980-2017, and a linear trend estimated on the pre-scheme data period 1980-2001. Panel B compares the net flow of immigrants from outside EU/EFTA (treatment group) to the net flow of immigrants from inside EU/EFTA (control group). Each series has been de-trended using a linear, group-specific trend estimated on pre-scheme data. We use EU membership in the pre-reform year (2001) to define the control group. The annual net flow of immigrants is measured as the year-to-year change in the stock of immigrants. The sample is restricted to immigrants who are at least 30 years of age, and immigrants from Bosnia are dropped throughout.

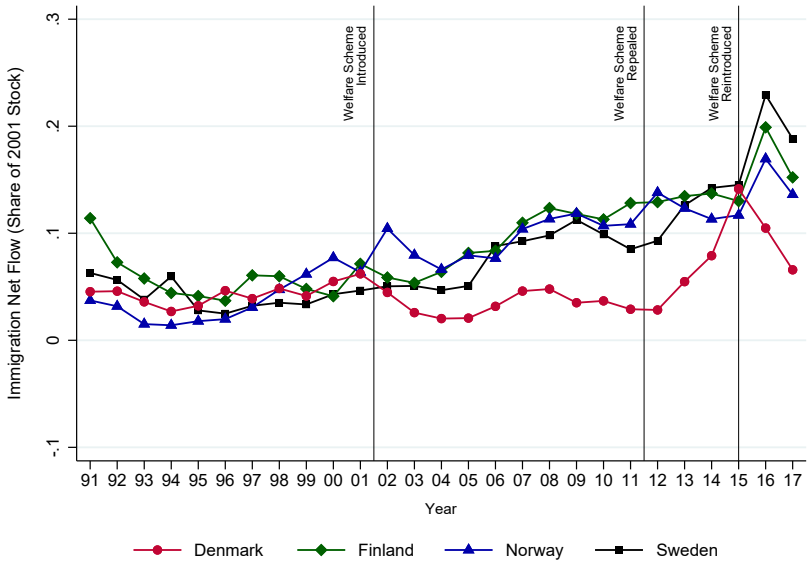
Figure 3: Immigration Inflows by Type of Residence Permit



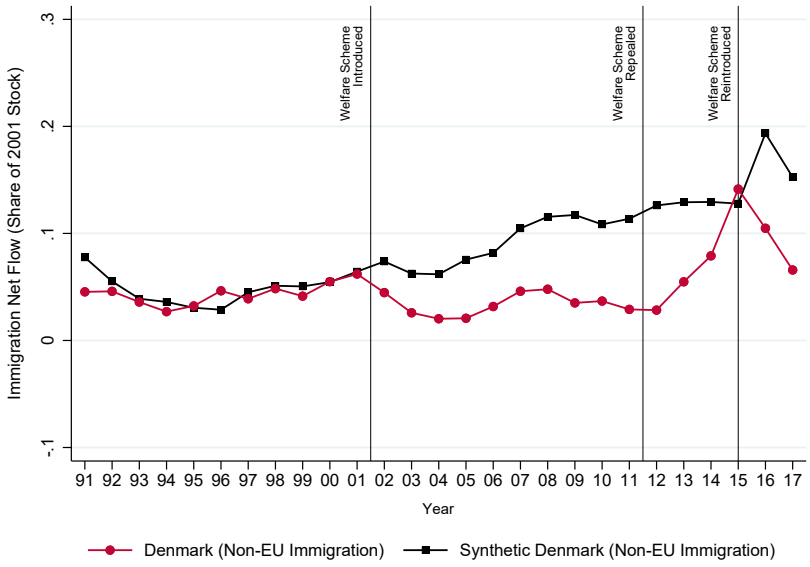
Notes: The graph shows the inflow of immigrants in Denmark from outside the EU/EFTA by type of residence permit (asylum, family, and work/study) over the period 1997-2017. Each series has been de-trended using a linear, group-specific trend estimated on pre-scheme data (1997-2001). The sample is restricted to immigrants who are at least 30 years of age, and immigrants from Bosnia are dropped throughout.

Figure 4: Welfare Magnet Effects: Cross-Country Evidence

A: Non-EU Migration to the Nordic Countries



B: Synthetic Control Approach



Notes: Panel A shows the annual net flow of immigrants from outside the EU/EFTA to each of the four Nordic counties, divided by the country's 2001 stock of non-EU/EFTA immigrants. Panel B retains the same data series for Denmark as Panel A, but combines the three other Nordic countries into one synthetic control country, labeled "Synthetic Denmark". This series is constructed as a weighted average of Finland, Norway and Sweden to minimize the sum of squared errors in the pre-reform (1991-2001) immigration flows between Denmark and Synthetic Denmark. This yields the following weights: Finland 0.468, Norway 0.361, Sweden 0.171. Unlike the within-country analysis, no age restriction has been placed on migrants. To correct for the pre-reform Bosnia shock, immigrants from the former Yugoslavia are dropped throughout.

Table 1: Migration Responses to the Immigrant Welfare Scheme

	Age $\geq$ 30		Age $\geq$ 24		Age $\geq$ 18	
	Syria	No Syria	Syria	No Syria	Syria	No Syria
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Effects on Net Flow (Fraction of 2001 Stock)						
Effect of Benefits (USD 100)	0.0044***	0.0047***	0.0041***	0.0044***	0.0039***	0.0043***
	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0008)	(0.0008)
Observations	444	444	444	444	444	444
Panel B: Effects on Gross Inflow and its Composition (Fraction of 2001 Stock)						
Effect of Benefits (USD 100):						
Total	0.0037***	0.0035***	0.0036***	0.0035***	0.0037***	0.0036***
	(0.0005)	(0.0006)	(0.0006)	(0.0007)	(0.0007)	(0.0007)
Asylum	0.0028***	0.0026***	0.0029***	0.0028***	0.0028***	0.0027***
	(0.0005)	(0.0005)	(0.0006)	(0.0007)	(0.0006)	(0.0007)
Family	0.0022***	0.0022***	0.0026***	0.0026***	0.0028***	0.0028***
	(0.0005)	(0.0005)	(0.0006)	(0.0006)	(0.0007)	(0.0007)
Work & Study	0.0004	0.0004	0.0002	0.0002	0.0002	0.0002
	(0.0003)	(0.0003)	(0.0005)	(0.0005)	(0.0005)	(0.0005)
Observations	252	252	252	252	252	252

Notes: The table shows the effects of welfare benefits (in 100s of dollars) on the net flow of immigrants (Panel A) and on the gross inflow of immigrants by type of residence permit (Panel B) as a fraction of the pre-reform stock. The estimates are based on the regression specification (1) and correspond to the parameter $\hat{\beta}$. As described in the main text, the specification is run on de-trended outcome variables, i.e. the residual between the raw immigration outcome and a linear, group-specific trend estimated on pre-scheme data. Across columns, we consider different sample restrictions by varying the age threshold and whether Syrian immigrants are included or not. Immigrants from Bosnia are dropped from the sample in all specifications.

Online Appendix (Not for Publication)

Figure A.I: Ad Campaign in Lebanese Newspapers and Online, September 2015

7/9-2015

The Danish immigration authorities are informing about changes of conditions regarding residence in Denmark being implemented by the new Danish government

Denmark has decided to tighten the regulations concerning refugees in a number of areas.

The Danish Parliament has just passed a regulation to:

- Reduce the social benefits significantly. The social benefits for newly arrived refugees will be reduced by up to 50 percent.

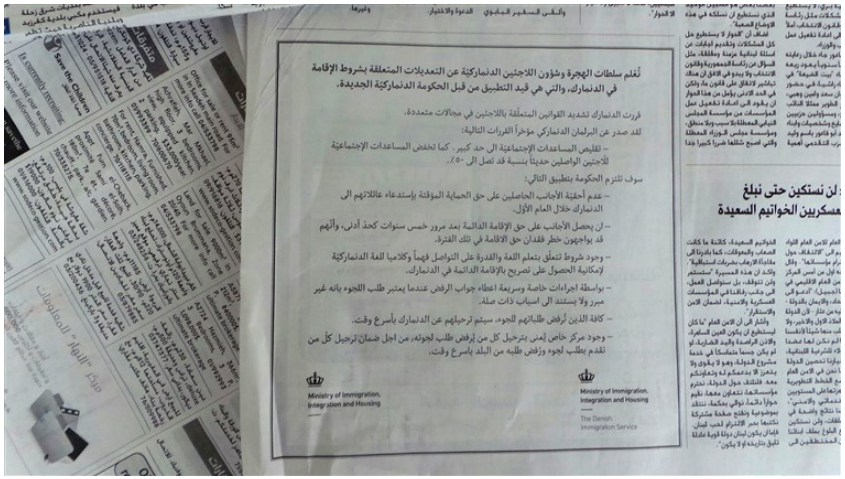
The government will maintain and ensure that:

- Foreign nationals granted temporary protection in Denmark will not have the right to bring family members to Denmark during the first year.
- Foreign nationals can only be granted a permanent residence permit after 5 years at the earliest. Prior to this they risk having their residence permit revoked.
- In order to obtain a permanent residence permit in Denmark there are language requirements in terms of the ability to speak and understand the Danish language.
- When an application for asylum is regarded manifestly unfounded it is refused in accordance with a particularly expedited procedure.
- All rejected asylum seekers must be returned quickly from Denmark.
- There is a special return centre to ensure that rejected asylum seekers leave Denmark as quickly as possible.

Ministry of Immigration, Integration and Housing

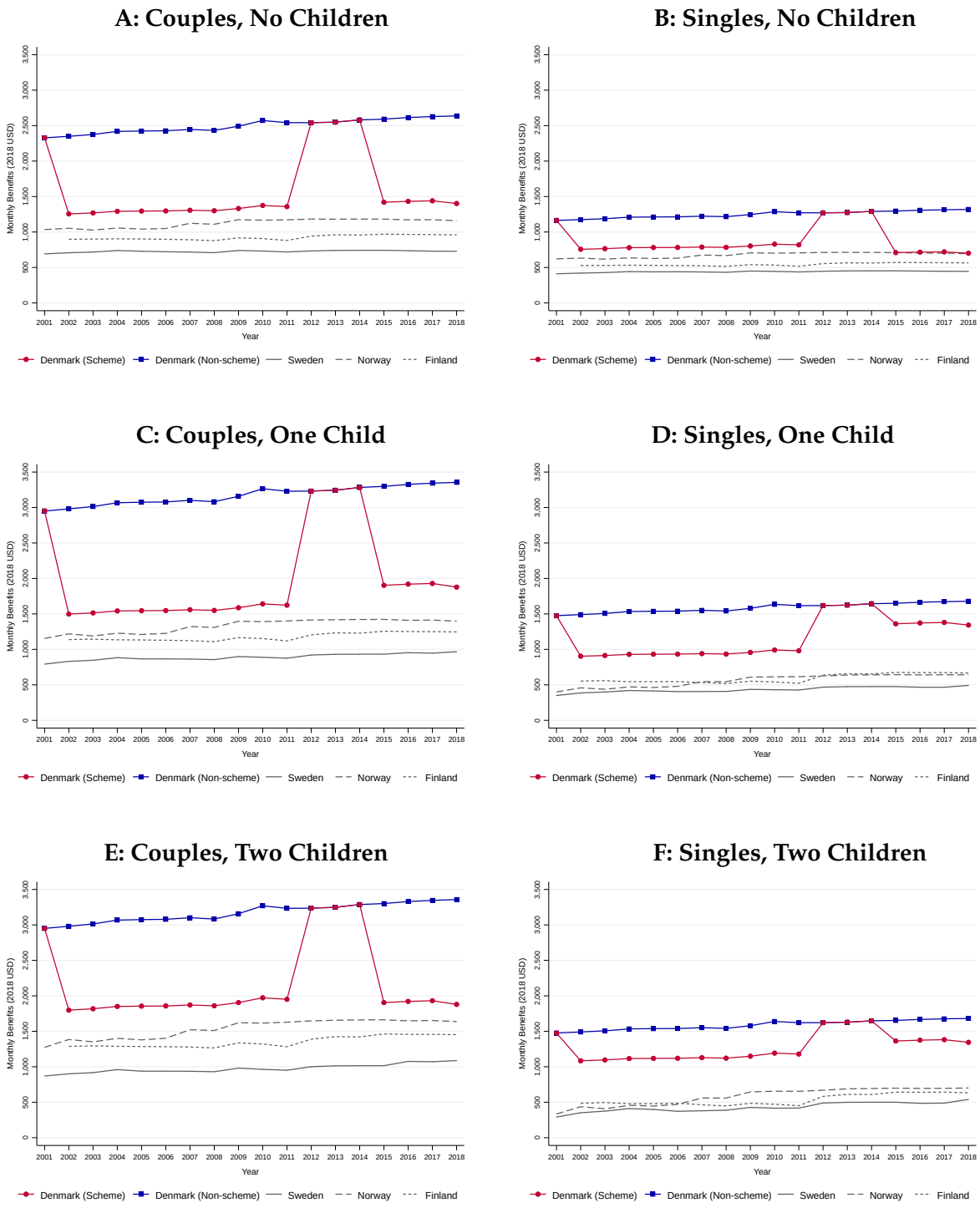
Ministry of Immigration, Integration and Housing

The Danish Immigration Service



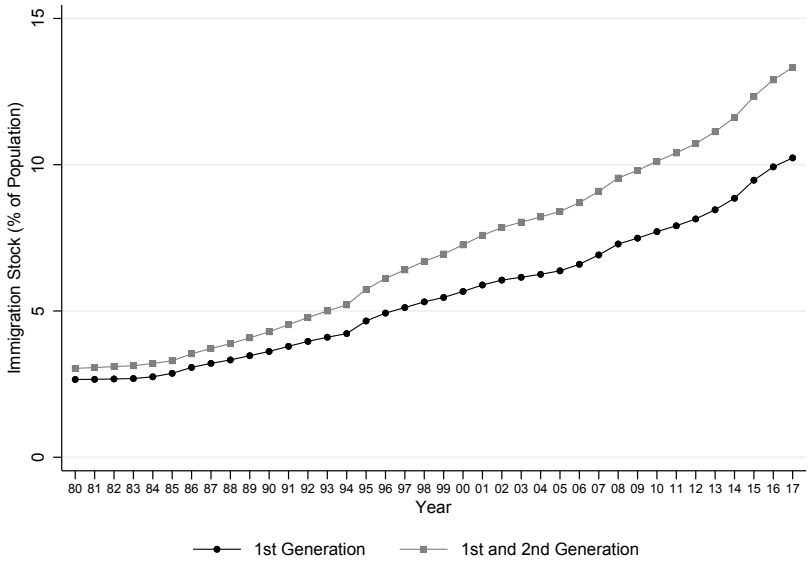
Notes: The two pictures show an ad campaign run by the Danish Government in September 2015 to inform potential immigrants about the recently (re)introduced welfare scheme, along with information about other regulatory rules (which did not change as part of the reform). The left picture shows the campaign text in English released by the Danish Ministry of Immigration. The right picture shows the printed ad (from NBC News: https://www.nbcnews.com/storyline/europes-border-crisis/denmark-buys-ads-lebanon-newspapers-aimed-refugees-n423216). The ad campaign ran online and in Lebanese printed newspapers.

Figure A.II: Cash Welfare in Denmark and Other Nordic Countries 2001-2018



Notes: The figure shows welfare benefits (in 2018 USD) for different household types across the Nordic countries. For Denmark, the graphs show the level of both scheme benefits and non-scheme benefits. Information on scheme benefits in Denmark are based on the website of STAR (The Danish Agency for Labour Market and Recruitment). The remaining benefits data are based on our own calculations using the OECD tax-benefit calculator. The calculations give benefits for non-employed households at age 40 who have been out of work for three months. For households with children, the age of the first child is set to 10 and the age of the second child is set to 8. The benefits include only cash welfare. They do not include unemployment insurance or in-kind benefits such as housing support.

Figure A.III: Immigrant Stock 1980-2017



Notes: The figure shows the share of first-generation immigrants and the share of first- and second-generation immigrants in the Danish population. Definitions of first- and second-generation immigrants follow the official definitions of Statistics Denmark: a first-generation immigrant is a person who was born outside of Denmark and where neither of the parents are Danish citizens and born in Denmark. A second-generation immigrant is a person who was born in Denmark and where neither of the parents are Danish citizens and born in Denmark.