THE UNIVERSITY OF CHICAGO

THE SOCIAL DETERMINANTS OF REFUGEE INTEGRATION AND IMPROVED DISPERSAL: A STUDY IN DENMARK

A DISSERTATION SUBMITTED TO
THE FACULTY OF THE DIVISION OF THE SOCIAL SCIENCES
IN CANDIDACY FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

KENNETH C. GRIFFIN DEPARTMENT OF ECONOMICS

BY
LAURA SALE

CHICAGO, ILLINOIS
JUNE 2022

Contents

List of Figures

List of Tables

Acknowledgements

I would like to thank the Rockwool Foundation and CEHD for providing access to the data from Statistics Denmark that was used for this project. I am very grateful for the advice and support I have received from Steven Durlauf, Stéphane Bonhomme, and Magne Mogstad. I have benefitted from feedback from Rasmus Landersø, the members of the Surviving Hopefuls of Applied Microeconomics, and the attendees of the Public/Labor Lunch at the University of Chicago. All errors are my own.

Abstract

Using data from refugees resettled quasi-randomly to municipalities across Denmark, I study the impact of enclave characteristics and details of the placement regime on labor market outcomes for refugees up to 12 years after seeking asylum. I find that being placed in larger enclave has positive effects on refugees' employment, while the causal effect of increasing an refugee's enclave population is negative for the initial size but positive for size measured concurrently with employment. The timing of the settlement of other refugees is also important, with refugees placed in the same year or in consecutive years in an enclave lowering each other's probability of employment. I show that under optimal distribution of refugees over time and municipalities, employment for the refugees placed during the spatial dispersal policy would have been 9.7% higher, with most of the increase concentrated in municipalities that received more refugees.

1 Introduction

Refugees face a daunting set of challenges to integration. They are unlikely to have much experience with the language or customs of their new country or to have social contacts who could assist with job finding or connecting them to resources. In many cases, educational or work qualifications previously obtained in their home countries are not recognized in their destination countries. Unlike other migrants, they may not have skills that are advantageous for finding work in their new country. Notably, these difficulties contribute to very low rates of employment for refugees in many countries. In the group of refugees in Denmark that I study, fewer than half of working age male refugees are employed, even ten years after their arrival. Beginning in the early 2000s, these poor employment outcomes reinforced a backlash against immigrants and refugees in Denmark that has taken the form of resistance to admitting refugees, reductions in public transfers, and higher punishments for crimes committed in areas with high concentrations of immigrants. Location of residence has been shown in previous work to have an important influence on refugees' employment.[1] In Denmark, the US, and other countries, the government or refugee settlement agencies play a role in detemining where refugees who have been granted asylum will be resettled. Given the significance of location to refugee outcomes, altering refugee placement strategies may be a relatively low cost intervention with the potential to improve employment rates.

The goal of this paper is to analyze how Denmark's system of assigning refugees to locations for settlement affects refugees' labor market outcomes and to describe modifications to this system that would increase their employment. Denmark is a useful setting in which to study refugees for several reasons. First, under the spatial dispersal policy for refugees, those granted asylum were settled to municipalities across the country quasi-randomly. This helps to resolve the issue of identifying the effects of place of residence on employment since there is a component of location that is random conditional on observed demographic variables. Additionally, Denmark has had a long history of admitting refugees and, beginning in the 1980s, had one of the highest per-capita

[1] See for instance Edin, Fredriksson, and Åslund (2003); Damm (2014); Cutler, Glaeser, and Vigdor (2008).

refugee admission rates among European countries.[2] Finally, Denmark collects detailed annual data on location and employment. These conditions mean that there is a large population of refugees to study and over a decade during which refugees are quasi-randomly assigned, resulting in a long panel of employment outcomes.

This work has two main contributions, which are guided by what can be identified using Denmark's refugee placement mechanism, which produces variation in where individual refugees are assigned and in the number of refugees that are assigned to enclaves. I estimate two sets of parameters that describe the effect of ethnic enclaves on employment. One set of parameters is the effect on employment probability of being placed in a municipality with a larger enclave, while the second set is the causal effect on employment of increasing the enclave size, holding the municipality characteristics fixed. I estimate the impact of initial and current enclave population on twelve years of refugee employment. To accomplish this, I use the flow of previous placements of new refugees into enclaves as instruments for the number of enclave residents. I also consider the possibility of temporal heterogeneity in the relationships between refugees who arrived around the same time compared to relationships with other enclave members by estimating the effects on labor market outcomes of own cohort size and the size of cohorts who are placed in the years subsequent to one's own arrival. I find that refugees benefit when placed in municipalities where they are exposed to larger ethnic enclaves. Some of this effect however, can be attributed to selection of refugees and immigrants to cities where they have better employment prospects, since the causal effect of increasing initial enclave size is negative. I do find a beneficial effect of increasing current enclave size, which is the population of the refugee's enclave measured in the same year as employment is measured. The effects of own cohort size and of the subsequent cohort are negative, implying that refugees placed in an enclave around the same time primarily crowd each other out, possibly through competition for introductory resources or jobs.

The second contribution of this work is to use the effects of enclave characteristics to describe a method for allocating refugees to enclaves over time that would result in increased employment

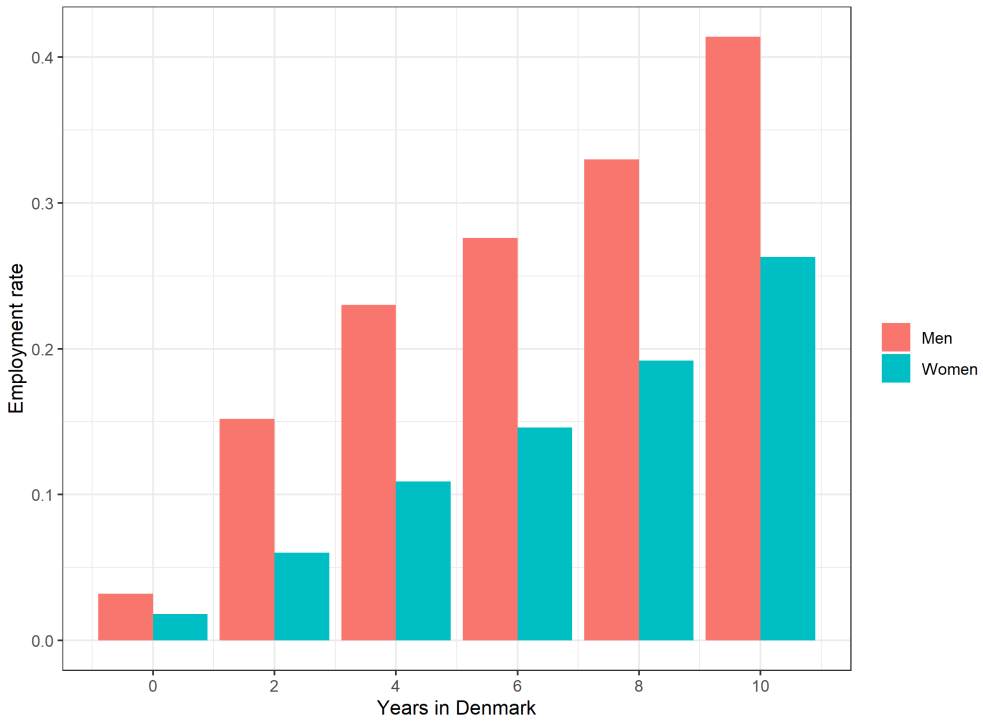
[2] United Nations High Commissioner for Refugees (2001).

levels. To do this, I obtain expected enclave sizes based on refugee placements, and use the predicted encalve sizes to simulate employment under alternative placement patterns. I can then solve for the assignment mechanism that maximizes expected employment. In this procedure, I consider a constrained set of possible allocations that closely resemble the actual placement of refugees that occurred during the policy period in Denmark and which use only information I can obtain from the variation generated by the dispersal policy. Specifically, I allow regulators to make choices of allocating refugees based only on enclave size. It might be desirable for policy makers to consider other enclave qualities, such as the employment rate or the prevalence of crime, but I do not have the information to identify the effects of these factors separately from the effect of particular municipalities overall. I do, however, have credible variation to assess the impact of enclave size. Second, I impose the restriction that the total number of refugees assigned to a municipality in counterfactual placement policies must be the same as the number actually placed during the 1986-1998 dispersal period. The purposes of this constraint are to respect the Danish governments goal of distributing refugees in proportion to municipal population and to ensure that alternative policies do not result in significant changes in the broader municipality labor market or overly tax local public resources. If the number of refugees that arrive in a municipality is well above the observed amount, this could have spillover effects on wages or employment rates for other residents. Restricting the total number that can be placed avoids this issue. These constraints mean that policy possibilities consist of variations in the composition of the country of origin of the refugees assigned to a municipality and in the timing of assignment. Even under this limited set of possible placement policies, employment gains can be made. I estimate employment under the proposed dispersal policy would be 9.7% greater than under the realized policy.

Much of the recent debate around refugees has centered on how many should be admitted, rather than on how to improve their outcomes. Over the past decade, the US has admitted 542,327 refugees, but that number has declined precipitously in recent years, from a high of over 200,000 in 1980 to 11,411 in 2021.[3] This is due, in part to policies designed to reduce the number of immigrants to the US, for example the controversial Remain in Mexico policy established under the Migrant

[3]Refugee Processing Center (2021).

Figure 1: Refugee employment



Plotted is the employment rate by relative year in Denmark for all refugees who arrived between 1986 and 1998. Employment rates are measured over the same period.

Protection Protocols in 2019 which prevents many refugees from entering the US until they have been granted asylum. Presently, there is an urgent need for refugee resettlement, with 600,000 Afghan refugees having fled their homes in 2021,[4] the United States' committment to accept up to 100,000 refugees from Ukraine, and the possibility of future climate refugees as parts of the world become uninhabitable due to extreme weather. Given that in most countries, refugees receive initial aid in finding housing, governments and resettlement organizations have an early opportunity to create a path for smooth integration by improving their patterns of placement. Understanding how to do this would enable agencies to improve the lives of the refugees that are expected in the coming years and to make welcoming refugees more desirable to citizens of the refugees' destination countries.

[4]USA for UNHCR (2021).

2 Existing literature

There is a substantial body of literature studying the impacts of ethnic enclaves on refugee labor market oucomes. Among the earliest research studying this topic is Edin, Fredriksson, and Åslund (2003). The authors employ Sweden's refugee dispersal policy to assess the effect of enclave size on refugee employment eight years after their arrival, instrumenting for current enclave size with the size of the enclave the refugees were initially assigned to. The authors find that the number of people from the same country has a positive effect on employment. Similar in spirit, Damm (2009) estimates the effect of initial enclave size on refugee employment seven years after settlement. Damm uses the sum of all earlier placements of refugees as an instrument for initial enclave size and finds that a one standard deviation increase in enclave size increases earnings by 18%.

Since these papers, researchers have studied how the composition, in addition to the size, of an enclave impacts refugee employment. These authors suggest that the length of residence of enclave inhabitants or the types of jobs they hold will effect the labor market outcomes of new refugees. Among refugees settled in the US, Beaman (2012) finds that length of residence in the US mediates the effect of network members on new refugees. Larger numbers of refugees who have been in the US for at least two years are beneficial to the employment prospects of newly settled refugees, while greater numbers of refugees settled in the past year are detrimental. This is consistent with a job-information sharing model in which longer-tenured network members are more likely to share job opportunities but recent arrivals are competitors for these opportunities. Work by Dagnelie, Mayda, and Maystadt (2019) also studies refugees in the US. The authors find that business owners have positive effects on the employment of refugees in their network, but larger numbers of refugee employees in the network reduces new refugee employment. These papers only consider employment 90 days after arrival in the US. The implication of these two papers is that more established refugees, in particular those who are entrepreneurs, are complements to new refugees, while less established refugees are substitutes. My analysis further explores the importance of the timing of refugee placement.

A recent branch of the refugee integration literature uses machine learning techniques to estimate match quality between refugees with sets of characteristics and particular placement locations. Bansak et al. (2018) uses data from the US and Switzerland and estimate employment probability for matches between refugees and placement locations based on characteristics including age, country of origin, languages spoken, and education. The authors find a potential 41% gain in employment in the US and 73% gain in Switzerland from improved allocation of refugees to municipalities. Ahani, Andersson, et al. (2021) expands on the work by Bansak et al., improving calibration and solving for employment-maximizing placement subject to additional location capacity constraints including housing availability, slots in eductional programs, and processing capacity. The authors find that their placement would have resulted in a 34-37% increase in short run employment among refugees settled in the US. Most recently, Ahani, Gölz, et al. (2021) introduces a dynamic allocation system. While Ahani, Andersson, et al. (2021) matches refugees to cities to maximize the employment of each cohort of refugees individually, this paper considers how refugee settlement should occur over time within a year. Without dynamic assignment, slots in beneficial cities will be filled early in the year, potentially by refugees who will not gain as much, rather being preserved for later refugees who will benefit more. The authors' model treats enclave-refugee match quality as fixed and does not consider that the introduction of refugees may change the employment prospects for enclave members.

My work is complementary to the machine learning approach embodied by Bansak et al. (2018), Ahani, Andersson, et al. (2021), and Ahani, Gölz, et al. (2021). These authors answer the question of which refugees should be sent to which cities, and find that large gains in employment can be attained. I ask how refugees should be allocated over time and how many refugees should be allocated to each enclave while accounting for the influence that enclave members have on each other. My approach results in more modest increases in employment, but it is useful when deciding how to settle refugees in cities for which there is no previous data on refugee integration or when little is known about the skills and needs of the refugees themselves. Future work should consider both refugee interactions and location-refugee match quality.

The existing literature estimates the effect of initial location characteristics on refugee integration, but does not capture the full effect of the refugee placement policy on refugee outcomes. Ahani, Gölz, et al. (2021) improve on this by considering dynamic allocation, but the optimization does not take into account the impact of settlement policies on enclave characteristics and is limited to the effects on people seeking asylum in a single year. If the goal is to increase refugee integration and employment, then one should consider the settlement plan as whole and estimate the effects that new refugees have on those refugee who already live in a city. My paper studies these effects in addition to initial enclave effects and estimates the effect over a long time horizon, up to twelve years after arrival in Denmark. Using these results, I characterize the employment maximizing settlement plan.

3 Background and data

3.1 Spatial dispersal policy

For this project, I use annual administrative data from Statistics Denmark for the years 1986-1998. In this time period, Denmark had in place a spatial dispersal policy for assigning refugees to municipalities to be settled. The policy resulted in conditionally random variation in the location to which individual refugees were assigned and variation in the number of refugees who were assigned to enclaves in each year. The program was implemented with the primary aim of preventing large numbers of refugees from clustering in Denmark's more populous cities, instead spreading refugees geographically over the country in proportion to the exisiting Danish population. There were two reasons for this. Refugee Council officials believed that living in neighborhoods with high densities of non-European immigrants, who tend to be poorer and have lower education levels, would be detrimental to the integration process for refugees. In cities without large populations of immigrants, refugees would interact more with native Danes and thereby join Danish social and economic life more easily. The second purpose was to share the costs of resettlement, such as provision of public housing and other support services, more equitably across municipalities.

Settlement of refugees occurred in two stages. After a refugee was granted asylum, the Danish Refugee Council received a packet of information about the refugee consisting of six pieces of information: the refugee's country of origin, gender, family status, educational and health needs, and location of close family members. The Council determined where to send each refugee based on this questionnaire. In the second phase, local offices of the council assisted refugees with finding housing and provided other support. Once placed in a municipality, refugees received welfare benefits and 18 months of Danish language training. Those who arrived prior to 1999 had access to the same welfare payments as people born in Denmark.

All refugees who were granted asylum between 1986 and 1998 were placed via the previously described mechanism, unless they had gained residence through family reunification or could find their own housing. Between 1986 and 1994, 91% of refugees received housing assistance according to the terms of the dispersal policy.[5] Refugees were encouraged to remain in the cities where they were placed through at minimum the first year and a half during which they were engaged in introductory training, but they were free to move. If refugees moved, there would be no reduction in public transfers, but they would not receive assistance to find housing again. Approximately a quarter of refugees move to a new city after a year in Denmark, and 56% move after 10 years. I classify placement municipality as the location in which I first observe a refugee, although as observations are annual, if refugees move within a year, their initial location could be misclassified.

3.2 Sample selection

The relevant population for this study are refugees whose placement can be considered quasi-random. As refugee status refugee status is not observed in the data, I filter refugees using the restrictions described in Damm (2009), classifying refugees as all people who arrive in Denmark in the years 1986-1998 from the top 8 refugee sending countries, excluding those who have a spouse from Europe at the time of entry to Denmark. Additionally, I exclude refugees arriving from Bosnia-Herzegovina. These refugees arrived in very large numbers beginning in 1995 and therefore

[5] Damm (2005).

a separate and non-random program was developed for resettling them.[6]

Among refugees, my sample consists of those likely to be placed quasi-randomly in municipalities. Damm (2005) confirms that conditional on the six variables that were sent to the Refugee Council, or their proxies, settlement location is random. Country of origin, gender, and family composition are observed directly in the data, and Damm demonstrates that educational needs can be controlled for by age, so allocation based on these variables is not an issue. To address the issue of health requirements and location of close family members, I exclude any refugees who were hospitalized in the first year of residence or who have a spouse, parent, or child who arrived in Denmark prior to themselves. The initial municipalities for these people cannot be taken as random because the Council may be more likely to place them near family or adequate medical resources. In total, 79,851 people arrived in Denmark from the top refugee sending countries over the course of the dispersal period. 59,613 are classified as refugees according to my criteria, and of these refugees, 55,760 are randomly placed. Among those, I include only the refugees who are of working age, 18-64, at the time arrival, which leaves a sample size of 32,518.

3.3 Individual random assignment

Based on interviews with placement officers, Damm (2005) writes that the Refugee Council did not meet with refugees prior to geographically assigning them and so placement should be random conditional on the data that the council had access to. In order to confirm this, it would be useful to show that other refugee initial characteristics are independent of the assigned municipality after controlling for the information in the Council's questionnaire.

This is somewhat difficult since there are not many variables in the data set that are outside of the Council's information set, but one such variable is the education level measured in the year of arrival. I do not include education in the rest of my analysis because this information is missing for around half of the sample. The lack of measurement seems to be a consequence of Danish offi-

[6] Damm (2005).

Table 1: Summary statistics

	Mean	Standard deviation
Male	0.509	
Married at arrival	0.628	
Age at arrival	29.5	10.22
Country of origin		
Afghanistan	0.034	
Ethiopia	0.016	
Iran	0.173	
Iraq	0.197	
Lebanon	0.204	
Somalia	0.155	
Sri Lanka	0.130	
Vietnam	0.091	
Initial enclave size	408.8	678.6
Cohort size	54.5	69.4
Observations	32,518	

cials not considering educational qualifications obtained outside of Denmark to meet the country's requirements, and therefore not recording educational attainment in many cases. The missingness means that education level is not very useful as an explanatory variable for employment outcomes, but it may still be used to verify random assignment among those for whom it is measured.

Education is especially useful because it is a variable that seems likely to affect placement if placement were not random. More educated refugees likely had more resources before leaving Denmark and may have been better able to navigate the asylum and resettlement systems. It is reasonable to think that if anyone were able to influence municipality assignments, it would be more educated refugees. If initial location was randomized, then we should expect that refugees' education level at the time of arrival will be uncorrelated with characteristics of the municipalities to which they are assigned. To test this, I regress municipality population, enclave population, and municipality immigrant share on an indicator for a refugees having obtained higher education prior to arrival in Denmark. In this estimation, I control for gender, marital status at the time of arrival,

arrival age, country of origin, year of arrival, and the demographics of other refugees who arrived in the same year. This is the same set of variables that I use as controls in the causal estimates throughout the paper. The results are in the Appendix in Table A.1. I find that education level has no statistically significant effect on any of the municipality of assignment characteristics tested. Since education level is uncorrelated with municipality features that refugees would be expected to care about, the results should increase confidence that assignment was conditionally random.

3.4 Two forms of variation

The Council's spatial dispersal policy results in two useful forms of variation. The first derives from the quasi-random assignment of individuals to locations, and the second from the fact that there is randomness in the total number of people assigned to enclaves each year. The random assignment of particular refugees means that individual skill and utility of work will be uncorrelated with the local labor market in which they are settled. This form of variation would allow me to identify the effects of each municipality on refugee employment. It will not, however, identify the effects of changes to characteristics of enclaves on individuals' employment since neighborhoods are formed by a process in which people are able to move to cities that suit them best. For example, regression of employment on initial enclave size will be biased, even under initial random assigment, if other people of the same ethnicity move to more favorable local labor markets. Labor market quality will then be correlated with enclave size. I can however, use just individual random assignment in order to estimate the effect of being assigned to a municipality with an enclave of a particular size. The parameter obtained will include effects from other municipality characteristics that are correlated with enclave size, but it is not the causal effect of enclave size.

The second form of variation arising from the dispersal policy solves this problem. In addition to variation in where individuals were settled, the placement mechanism resulted in randomness in the number of people who are settled in each enclave in each year. Using a similar method to the one proposed in Damm (2009), I can therefore estimate the effect of enclave size on employment by using the number of refugee placements in previous years as an instruments for enclave size. Since

the policy provides direct variation in the in the flow of refugees that an enclave is exposed to, I can also estimate the effect of introducing new refugees on the employment of refugees already in an enclave. The assumption underlying this approach is that the stream of future placements to an enclave is random conditional on the municipality, the number of refugees who have already been assigned to that municipality, and the characteristics of the refugees who arrive in Denmark. The number of refugees placed in each year will not be unconditionally random since the placement program was designed to achieve proportionate distribution, and so the total number of refugees to be sent to each municipality over the dispersal period is not random. Municipalities with larger populations will receive more refugees overall, but my assumption is that conditional on the number of refugees who have been sent to the municipality prior to some year t, the number sent from a single country in year t will be uncorrelated with the enclave's labor market conditions.

4 Enclave size effects

Do refugees have the greatest chance of economic integration in locations with large or small populations of people of the same ethnic origins as themselves? In other words, is the effect of living in a larger ethnic enclave on the probability of employment positive or negative? There is mixed evidence in the literature regarding this question. People from the same country of origin may provide support to one another, communicate job opportunities, and be more likely to hire each other. Consistent with this mechanism, Edin, Fredriksson, and Åslund (2003) finds evidence that larger current enclave sizes are associated with higher employment, but that the quality of the enclave matters. Damm (2009) finds evidence that a larger initial enclave has positive effects on refugees' integration, resulting in higher earnings. Similarly, Larsen (2011) suggests that social ties within immigrant groups may foster connections to society outside of the ethnic enclave. On the other hand, Cutler and Glaeser (1997) finds negative effects of enclave size, hypothesizing that larger enclaves allow refugees to remain isolated and make it less likely they will develop skills specific to their new country, such as language fluency. Wahba and Zenou (2005) shows conditions under which the probability of job finding is concave with respect to network size and that there is

a threshold above which it is decreasing.

The studies described focus on the ways in which people with common ethnic backgrounds directly affect each others' employment. However, enclaves may affect employment prospects in both direct ways through the members themselves, or through other amenities that are associated with greater numbers of people with the same origins. People of the same nationality share cultural traditions and norms that may make them more likely to befriend, share information regarding employment opportunities and norms, and directly hire each other. Alternatively, they may compete for the same types of jobs or reinforce norms surrounding participation in the underground economy. These effects operate directly through the size of the member network. Refugees may also fare better or worse in larger enclaves due to amenities that are associated with enclaves, but are not directly caused by the number of residents of the enclave. Such effects could be driven by differences in the match quality between groups and locations, for instance a match between regional labor demand and the skill sets of particular immigrant groups, or availability of schools, housing, transportation, or other amenities that meet a group's needs. Some such desirable location attributes will impact employment opportunities. I am therefore grouping the way in which locations affect refugees' employment outcomes into two categories: direct effects of the number of enclave members and other locational effects, which I will denote by an unobserved term η_{tcm}.

Further, refugees likely relate to their social network differently over the course of their integration. In the earliest years, for instance, refugees may use their social contacts primarily for friendship, information about public resources, or translation services. Refugees may also be more susceptible to social influences when they first arrive and therefore more affected by norms regarding the expectations of employment in their neighborhoods. In subsequent years, the social network may serve a more important purpose as a source of information about job opportunities or direct hires from entrepreneurs in the enclave. With this in mind, I estimate the effects of initial and current enclave size separately. Initial enclave size is of particular interest because placement agencies have more direct control over this factor than over later variables since refugees may relocate.

I write the probability that agent i from country c in year a and living in municipality m, is

employed in period t as a function of the current and initial enclave sizes, S_{acm} and S_{tcm}, which I define as the number of first or second immigrants from the same country as i who live in the same municipality, m in i's first and current years in Denmark, respectively. Q_{tcm} is unobserved and describes the quality of the enclave labor market.

$$\tilde{Y}_{itacm} = \alpha + \beta_0 S_{acm} + \beta_1 S_{tcm} + \xi X_i + \eta Q_{tcm} + \epsilon_{it} \tag{1}$$

In equation (1), β_0 and β_1 represent the causal effects of an increase in the number of enclave members i is exposed to in their first year of residence and current year of residence, respectively. Q_{tcm} is not observed, however, so direct estimation of β_0 and β_1 by OLS is not possible. I will explain my method for estimating β_0 and β_1 in the following section. Another parameter of interest is the effect of placing a refugee in an enclave of a particular size, inclusive of the other amenities associated with enclaves of similar size, Q. These effects, B_0 and B_1 are defined by the following shorter equation:

$$\tilde{Y}_{itacm} = \alpha + B_0 S_{acm} + B_1 S_{tcm} + \xi X_i + \epsilon_{it} \tag{2}$$

The B parameters can be thought of as the effect of assigning a refugee to an enclave with a population equal to $n + 1$, rather than n, while β is the effect of increasing the population of the refugee's assigned enclave by one member. These effects differ because in the first case, the enclave is larger due to the movements between municipalities chosen by other refugees and immigrants, while the second is the result of a shift in the population size, holding other municipality characteristics fixed. The B parameters can be related to the βs by the formula for omitted variable bias, since Q_{tcm} is correlated with S_{acm} and S_{tcm}. If we were able to run the regression $S_{tcm} = a + \gamma Q_{tcm}$, recovering the effect of enclave quality on enclave size, then the parameters from the short and long regression would be related by $B_0 = \beta_0 + \frac{\eta}{\gamma}$. B_0 and B_1 are the causal effects of enclave size plus the effect from enclave quality that operates through enclave population.

In terms of policy significance, both sets of parameters have utility from the perspective of a government body charged with settling refugees. If the number of refugees to be resettled is small, then the B parameters may be of more use, as the agency is doing little to change the size of the existing enclaves. In this case, knowing in which cities refugees will be most likely to find work is sufficient and there is little need to understand if the effects of enclaves are operating directly through the number of members or through the amenities associated with large or small enclaves. However, if the agency is tasked with placing many refugees in permanent housing over a number of years, the β parameters become more important. This is because the resettlement agency is then playing an active role in enclave creation. By sending refugees to particular municipalities, they are increasing the size of the respective enclaves in a way that is distinct from the natural migration patterns that would occur due to other amenities. Understanding the effect of an increase in enclave members apart from changes in other amenities helps to reveal (i) the effect of placing a refugee in a larger enclave and (ii) the effect placing more refugees in an enclave will have on existing and future residents of that enclave. β can be used to help design a program of resettling refugees over time and over locations in order to improve their employment prospects.

4.1 Assignment to enclave of some size

I will first focus on estimation of B_0 and B_1, the effects on probability of employment of being assigned to an enclave with one additional person in a refugee's initial year in Denmark and in the year in which employment is measured. These parameters are given in equation (2).

4.1.1 Estimation

For the estimates of B_0, B_1 to be unbiased, a necessary assumption is that $S_{acm}, S_{tcm} \perp\!\!\!\perp \epsilon_{it}$. In this specification, B_0 and B_1 include the effects of local amenities that are associated with enclave size and ϵ_{it} denotes unobserved attributes of individual skill and preferences for work, not local labor market characteristics. This means that the independence requirement involves conditional random

assignment of refugees to initial locations, such that their utility of work is uncorrelated with the size of the enclave that refugees are assigned to. Under Denmark's assignment system, recall that the Refugee Council only observed basic demographic information of the refugees, and also was aware of previous refugee assignment decisions that they had made. Appendix B demonstrates in a simplified assignment process the conditions under which each refugee who arrives in the same year and has the same demographic profile is equally likely to be assigned to each enclave. With this understanding of the Council's assignment process, the municipality chosen to initially settle each refugee is random conditional on the Council's observed demographic information and year of arrival.

I therefore include as controls the demographics observed by the refugee council for the individual: age at arrival, family structure, gender, and country of origin, as well as the year in which the refugee arrives. The baseline specification that I use includes the individual demographics, X_i, and is given below in equation (3).

$$Y_{itacm} = \alpha + B_0 S_{acm} + B_1 S_{tcm} + \xi X_i + \delta_a + \delta_c + \delta_m + \epsilon_{it} \tag{3}$$

To assess non-linearity in the effects of enclave size, I include in separate specifications piecewise linear functions of current and initial enclave size, with break points at 75, approximately the median enclave population, and 600, which is the 85^{th} percentile.

4.1.2 Results

Results of the ordinary least squares estimation are contained in Table 2. I find that overall, refugees will have higher rates of employment when placed in municipalities with higher numbers of people who originate from the same country. The effects are relatively small, with a one standard deviation increase in initial enclave size producing a .7 percentage point increase in annual probability of employment, as demonstrated by the results from column (1) of Table 2. Including both initial and

current enclave size, as in column (3), shows that the effect of initial enclave size operates through the current enclave size, which is positive. A one standard deviation increase in current enclave size produces a 8.6% increase in employment probability. Including piecewise linear functions of enclave size shows that the effects of enclave size are concentrated in the lower range of enclave population. The effects of additional members is strongest among in enclaves below the median size of 75 members.

4.2 Effect of change in enclave size

A second type of enclave effect of interest is the causal effect of a change in enclave size on refugee employment. In contrast to estimation of the effect of being assigned to a place with a larger or smaller enclave, estimation of β_0 and β_1, the effects of a change in enclave size, requires an instrumental variables stragety. This is because the size of enclaves is likely to be correlated with unobservable location characteristics, Q_{tcm}, that may also impact refugees' employment opportunities.

4.2.1 Estimation strategy

Because of the unobserved relationship between enclave size and other enclave amenities, I use an instrumental variables strategy based again on variation provided by Denmark's spatial dispersal policy in order to estimate the causal effect of a change in enclave size on employment. In the method used to estimate B_0, B_1, I employed the fact that conditional on refugee demographics, refugee unaboservables are uncorrelated with the size of the enclave that they are assigned to. However, the size of the enclave of assignment was not uncorrelated with other enclave amenities. This is because refugees and other immigrants move between municipalities and select into the ones that are most favorable for them. Such movement may be in pursuit of better employment or for other reasons. The idea then, is to use the dispersal policy to recover the portion of enclave size that is not related to enclave amenities by using the flow of assignments of refugees into an enclave

Table 2: Effect of being placed in larger enclave

	Employment			
	(1)	(2)	(3)	(4)
S_a	0.007***		-0.050***	
	(0.002)		(0.002)	
$S_a \leq 75$		0.110***		-0.261***
		(0.021)		(0.034)
$75 < S_a \leq 600$		0.0002		-0.134***
		(0.004)		(0.006)
$S_a > 600$		0.007***		-0.036***
		(0.002)		(0.002)
S_t			0.086***	
			(0.002)	
$S_t \leq 75$				0.387***
				(0.043)
$75 < S_t \leq 600$				0.186***
				(0.008)
$S_t > 600$				0.068***
				(0.003)
Male	0.093***	0.093***	0.092***	0.092***
	(0.002)	(0.002)	(0.002)	(0.002)
Married	-0.042***	-0.043***	-0.040***	-0.039***
	(0.002)	(0.002)	(0.002)	(0.002)
Age 18-39	0.100***	0.100***	0.109***	0.109***
	(0.002)	(0.002)	(0.003)	(0.003)
Constant	-0.077***	-0.083***	0.075***	0.053***
	(0.007)	(0.007)	(0.008)	(0.008)

Notes: *p<0.1; **p<0.05; ***p<0.01,
Standard errors are clustered at the enclave level. Enclave size is normalized by its standard deviation. Controls not shown include country of origin, year of arrival, and municipality

as a set of instruments for enclave size. For this, I use the fact that there is a degree of randomness in the number of refugees assigned annually to each enclave.

The required assumption is that conditional on the municipality, demographics of the refugees who arrive, and the number of people who have already been assigned to the municipality in previous years, the number of refugees assigned to a particular enclave will be random. Allowing A_{tcm} to be the number of people assigned to enclave cm in year t, the condition is $A_{tcm} \Big| \sum_{j=1}^{t-1} \sum_k A_{jkm}, t, m \perp \perp Q_{tcm}, \ \forall t$, where the year fixed effects serve as a proxy for changes in the makeup of the years' arriving refugees. Then, the set of variables $A_{1cm}, ...A_{t-1,cm}$ can be used as a set of instruments for S_{tcm}, the size of the enclave. Appendix B demonstrates the randomness of cohort size. The first conditioning variable, $\sum_{j=1}^{t-1} \sum_k A_{jkm}$, or the number of refugees previously assigned to the municipality is necessary to include because of the Refugee Council's objective of balancing assignments at the level of the municipality. If the Council has already sent many refugees to a municipality in previous years, then all enclaves within the municipality are likely to receive fewer refugees in the coming years.

Intuitively, this assumption means that the breakdown of refugees by country of origin that is sent to a municipality does not depend on enclave-specific conditions. Since I am including fixed effects for municipality, it does not cause a problem if the Refugee Council had knowledge about the benefits of one municipality vs another for refugees and decided to send more refugees to the municipalities with more positive outcomes. What I am ruling out is decisions in which the Council believes that refugees from country c will do particularly well in municipality m, and therefore decides to send more refugees to enclave cm.

Ruling out such enclave-specific decision making may seem like a strong assumption. However, at the time of the dispersal policy, Denmark consisted of 275 municipalities. With refugees origininating from 8 countries, there were then 2,200 possible enclaves and it is therefore unlikely that the Refugee Council had in-depth knowledge of the country of origin-specific conditions in each municipality. If the Council were to make decisions based on enclave-specific information, then an expected implication would be that the share of refugees who come from country c as a

percentage of the total sent to municipality m should be higher if the members of that enclave had high employment rates in the years preceding the dispersal period. However, I find that there is no correlation between enclave employment rate in 1985 (the year just prior to the start of the dispersal program) and the share of the municipality's refugees that enclave received. See Figure A.5 in the Appendix for details.

This approach leads to first stage equations of the form

$$S_{acm} = \alpha^0 + \sum_{j=1}^{a-1} \pi_j^0 A_{a-j,cm} + \chi^0 \sum_{j=1}^{a-1} \sum_k A_{a-j,km} + \xi^0 X_i + \delta_a^0 + \delta_c^0 + \delta_m^0 + \epsilon_{iacm}^0 \tag{4}$$

$$S_{tcm} = \alpha^1 + \sum_{j=1}^{t-1} \pi_j^1 A_{t-j,cm} + \chi^1 \sum_{j=1}^{t-1} \sum_k A_{t-j,km} + \xi^1 X_i + \delta_a^1 + \delta_c^1 + \delta_m^1 + \epsilon_{itcm}^1 \tag{5}$$

Note that for the current enclave size, I use as instruments the placements to the enclave of intial assignment, even if the refugee moves between years a and t. This avoids any issues that would result from refugees selecting into more favorable enclaves.

The second stage then takes the form

$$Y_{iatcm} = \alpha + \beta_0 \hat{S}_{acm} + \beta_1 \hat{S}_{tcm} + \xi X_i + \chi \sum_{j=1}^{a-1} \sum_k A_{a-j,km} + \delta_a + \delta_c + \delta_m + \epsilon_{it} \tag{6}$$

4.2.2 Results

The results of the estimation procedure described above are contained in Table 3. The estimates of β_0, β_1, the causal effect of a change in enclave size, are modestly different from B_0, B_1, the effects of assigning an individual to a location with a larger enclave. Comparing the first columns of Tables 2 and 3, when estimated alone, B_0 is positive while β_0 is negative. This means that being assigned to a larger enclave is beneficial to refugees, but holding other characteristics of the municipality constant, increasing the number of immigrants from the same country in the city that a refugee is

assigned to has small but negative effects on the refugee's employment outcomes. This pattern is consistent with the idea that immigrants tend to move to areas that offer them better employment opportunities beacuse of factors such as higher demand for their skill sets. Areas where certain ethnic groups tend to perform better economically will therefore have more members of those ethnic groups. This is still useful information for a planner: sending refugees to locations where more of their conationals live results in higher rates of employment for them, but the effect of initial enclave size is operating through the other amenities associated with larger enclaves.

Turning to the combined effects of current and initial enclave size contained in column (3) of Table 3, a pattern similar to the estimates of B_0, B_1 appears. There is a negative effect of initial enclave size and a positive effect of currently measured enclave size. A one standard deviation increase in initial enclave size results in a 5.7 percentage point decrease in the probability of employment, while a one standard deviation increase in enclave size measured in the year of employment results in a 10.1 percentage point increase in the probability of employment. The implication is that refugees initially are somewhat harmed by living in larger enclaves, but are able to take advantage of the benefits from larger networks later on in their residencies.

Column (4) of Table 3 shows the piecewise linear estimates of the effects of changing current and initial enclave size. Some non-linearities do appear. Initial enclave size is slightly beneficial up to the median of 75 members, and detrimental above that size. The pattern is reversed for current enclave size, which is has a negative effect below the median, positive above. This suggests the possibility of threshold effects for the benefits of residing in an area with more people of the same ethnicity.

4.3 Gender differences

Female refugees are far less likely to find work in Denmark than their male counterparts, as shown in Figure 1. To the extent that this gap is driven by traditions and norms carried over from refugees' home countries, exposure to larger ethnic communities may impact labor market decisions and

Table 3: Effect of a change in enclave size

	Employment			
	(1)	(2)	(3)	(4)
S_a	-0.007***		-0.057***	
	(0.002)		(0.003)	
$S_a \leq 75$		-0.028***		0.048***
		(0.011)		(0.014)
$75 < S_a \leq 600$		-0.011***		-0.109***
		(0.005)		(0.014)
$S_a > 600$		-0.004		-0.052***
		(0.003)		(0.003)
S_t			0.101***	
			(0.002)	
$S_t \leq 75$				-0.108***
				(0.016)
$75 < S_t \leq 600$				0.189***
				(0.007)
$S_t > 600$				0.088***
				(0.003)
Male	0.091***	0.091***	0.090***	0.091***
	(0.002)	(0.002)	(0.002)	(0.002)
Married	-0.038***	-0.038***	-0.038***	-0.037***
	(0.002)	(0.002)	(0.002)	(0.002)
18-39	0.109***	0.109***	0.109***	0.110***
	(0.003)	(0.003)	(0.003)	(0.003)
Constant	0.120***	0.121***	0.066***	0.036***
	(0.008)	(0.008)	(0.008)	(0.008)

Notes: *p<0.1; **p<0.05; ***p<0.01,
Standard errors are clustered at the enclave level. Enclave size is normalized by its standard deviation. Controls not shown include country of origin, year of arrival, municipality, and the number of refugees previously assigned to the municipality of placement

opportunities in different ways for women and for men. If women and men socialize in distinct manners, they would most likely not accrue the same benefits from their ethnic communities. The impact of larger ethnic networks on women may also depend on the particular norms and levels of independence that women had in their home cultures. Whether an enclave is supportive of women moving into the workforce or reinforces more tradional roles for women could depend on gender norms that are brought from refugees' home countries. I address two questions in this section. First, does the effect of enclave size differ by gender? Second, does the effect of enclave population on women depend on the situation of women in their home countries. For simplicity and because it is the most straightforward target for policy makers, I focus on the effects of initial enclave size for both questions.

To answer the first question, I estimate the effect of initial enclave size alone and interacted with gender using equation (7), where $F_i = 1$ if i is a woman.

$$Y_{itacm} = \alpha + S_{acm}(B_0^m + B_0^f F_i) + \xi X_i + \delta_a + \delta_c + \delta_m + \epsilon_{it} \tag{7}$$

In equation (7), the effect of placing a man in an enclave with one additional person is to increase the probability that he is employed by B_0^m, and the effect on women of the same placement is $B_0^m + B_0^f$. I also estimate the causal effect of a change in the size of one's initial enclave using the two stage strategy described in the previous section. The first stage estimating equation is as before, equation (4), and I use equation (8) as the second stage in order to obtain the causal effect of a change in enclave size on each gender.

$$Y_{iatcm} = \alpha + \beta_0^m \hat{S}_{acm} + \beta_0^f \hat{S}_{acm} \times F_i + \xi X_i + \chi \sum_{j=1}^{a-1} \sum_k A_{a-j,km} + \delta_a + \delta_c + \delta_m + \epsilon_{it} \tag{8}$$

The way in which women are impacted by living in a community with many people from the same

country may be mediated by their cultural traditions. One would expect that larger communities are more able to sustain traditional practices and norms. In this scenario, it is plausible that refugee women from countries with strong traditional gender roles where women are unlikely to work outside the home would experience more negative employment effects from increased enclave sizes than women from other countries would, since the larger community is reinforcing at-home roles for women. In the sample of origin countries that I consider, there is a clear divide between the countries where women participate in work outside the home at relatively high rates and those where they do not. In Vietnam, Ethiopia, and Sri Lanka, the estimated female labor force participation rates in 1990 are 79.6%, 67.8%, and 48.8%, respectively. In the remaining countries, Afghanistan, Iran, Iraq, Lebanon, and Somalia, the female labor force participation rates are 25% or under.[7] All of the refugee originating countries have comparatively high male labor force participation rates. See Figure A.3 in the appendix for further detail.

The second question regarding the impact of enclaves on women is whether the enclave effects they face depend on norms in their home countries. I test this by estimating variations of equations (7) and (8) with the enclave size effects interacted with a dummy variable indicating whether the rate of female labor force participation, denoted hereafter FLFP, in country c is high or low, with $FLPF_c = 1$ for Afghanistan, Iran, Iraq, Lebanon, and Somalia, in which the female labor force participation rate was less than or equal to 25% in 1990. The specifications used to estimate the effects by gender and women's economic participation are given by equations (9) and(10).

$$Y_{itacm} = \alpha S_{acm} \times (B_0^{mh} + B_0^{fh} F_i + B_0^{ml} FLFP_c + B_0^{fl} FLFP_c \times F_i) + \xi X_i + \delta_a + \delta_c + \delta_m + \epsilon_{it} \quad (9)$$

[7] The World Bank Group (2022).

$$Y_{iatcm} = \alpha + \hat{S}_{acm} \times (\beta_0^{mh} + \beta_0^{fh} F_i + \beta_0^{ml} FLPF_c + \beta_0^{fl} FLFP_c \times F_i) + \xi X_i + \chi \sum_{j=1}^{a-1} \sum_k A_{a-j,km} + \delta_a + \delta_c + \delta_m + \epsilon_{it} \quad (10)$$

The results of these estimates are in Table 4, with the effects of being placed in an enclave that has a one-standard deviation larger population in columns (1) and (2), and the effects of an increase in enclave size in columns (3) and (4). Across all estimates, women experience a more positive effect from enclave size than men do. The first column shows that women accrue all of the benefit of being placed in a larger enclave relative to a smaller one and the effect of enclave size for men is statistically insignficant. In the IV estimate in column (3), the effect of increasing the size of the initial enclave for men is negative, while for women overall it is close to zero, $\hat{\beta}_0^{mh} + \hat{\beta}_0^{fh} = -.003$.

Columns (2) and (4) show the effects of enclave size interacted with gender and and female labor force participation rate. Column (2) shows that the effects of being placed in larger enclaves fall primarily on refugees from countries where women are more likely to work outside the home, with an effect on men of $B_0^{mh} = -0.011$ and the effect on women $B_0^{mh} + B_0^{fh} = 0.018$. Women from low FLFP countries do not receive as much benefit from being placed in a larger enclave as refugee women from high FLFP countries do, with the effect of placing them in a one standard deviation larger enclave equal to $B_0^{mh} + B_0^{fh} + B_0^{ml} + B_0^{fl} = 0.006$. Notably, men from countries with low FLFP also experience a negligible effect of being placed in a larger enclave. Column (4) contains the causal estimates of a change in enclave size. Recalling the results from Table 3, the overall effect of an increase in enclave size is to reduce employment probability. The interacted results in column (4) of Table 4 show that this is effect primarily operates on men from countries with high female labor force participation rates. The effect size is minimal on other groups, with the overall effects on low FLFP men, high FLFP women, and low FLFP women being -0.006, -0.006, and -0.004, respectively.

Considering the results by gender together, women tend to benefit from being placed in enclaves that are larger in their first year while men do not. The positive effects for women are concentrated in the enclaves of countries where women are more likely to participate in the economy outside of the home. The negative causal effects of a change in enclave size fall primarily upon men, particularly men from countries where women are more likely to work.

Table 4: Enclave effects by gender

	Employment			
	OLS		IV	
	(1)	(2)	(3)	(4)
S_a	-0.0002	-0.011**	-0.012***	-0.034***
	(0.002)	(0.005)	(0.003)	(0.006)
Female	-0.098***	-0.172***	-0.095***	-0.168***
	(0.002)	(0.004)	(0.002)	(0.004)
Low FLFP		-0.186***		-0.159***
		(0.007)		(0.008)
$S_a\times$ Female	0.012***	0.029***	0.009***	0.028***
	(0.002)	(0.006)	(0.002)	(0.007)
$S_a\times$ Low FLFP		0.013**		0.028***
		(0.005)		(0.006)
Low FLFP $\times$ Female		0.099***		0.095***
		(0.004)		(0.004)
$S_a\times$ Low FLFP $\times$ Female		-0.025***		-0.026***
		(0.006)		(0.007)
Constant	0.017**	0.042***	0.213***	0.238***
	(0.007)	(0.007)	(0.008)	(0.008)

Notes: *p<0.1; **p<0.05; ***p<0.01,
Standard errors are clustered at the enclave level. Enclave size is normalized by its standard deviation. Low FLFP indicates the 5 countries with female labor force participation rates below 30% in 1990. Controls not shown include country of origin, year of arrival, municipality, and the number of refugees previously assigned to the municipality of placement

5 Relative timing of placement

In this section, I investigate the impact of enclave composition in addition to size. Immigrants bring different requirements and skills to their networks over various phases of integration. Beaman (2012) established that the length of residence of other refugees in one's initial location influences whether the enclave size helps or harms labor market outcomes. Beaman finds that new refugees have negative and older arrivals have positive effects. The paper's explanation is that refugees who have not lived in their new country for long are likely to be searching for jobs and therefore competing with other unemployed refugees, while longer tenured residents are more likely to be employed and therefore able to offer connections to employment opportunities or be able to hire unemployed refugees themselves.

Because I am interested in assessing the impact of the dispersal policy on employment over multiple years, my approach to understanding the effect of the arrival of other refugees is to estimate the effect of the number of refugees placed in close time proximity on individual refugee employment. The effects found may differ from the results in Beaman (2012) as I am considering the effect on employment up to 12 years after placement, while Beaman only observes employment after 90 days. Over a short timespan, Beaman finds that refugees placed within two years of each other are competitors. Recent refugees may compete for slots in public programs, access to translation services, mentorship, and after the introductory period, for jobs without extensive Danish language requirements. In the longer run however, it is possible that there are benefits to being placed in the same window of time as refugees may form useful bonds during the shared introductory courses. When considering 12 years of employment, what is the effect of one's own cohort size and the size of cohorts placed in the following years?

The first and second stage estimating equations are similar to the instrumental variables strategy from the previous section. However, I include own cohort size as well as the number of people in the following two cohorts. As before, I condition on the demographics of arriving refugees and the number of refugees placed in the municipality by year $a-1$.

5.1 Results

Estimation results of the causal effect of enclave size and the size of near cohorts are contained in Table 5. The effects of current and initial enclave size are similar in magnitude to the results excluding cohort effects. I find that being assigned to a municipality along with a larger cohort of other refugees has negative effects on employment. Overall, a one standard deviation increase in cohort size reduces the annual probability of employment by 2.6 percentage points when not conditioning on following cohorts, and by 1.8 when the following cohorts are included in the estimation. The effect is negative at all cohort levels. The cohorts placed in the years following oneself also have negative impacts on employment, although the effects are smaller in magnitude than that of own cohort size.

Taken together, the results suggest that there are crowding out effects between refugees who are resettled in an enclave around the same time as each other. From the stand point of employment, friendships and supportive relationships made among refugees undergoing integration together seem to be outweighed by factors such as competition for introductory resources and jobs.

5.2 Current vs. Initial enclave size

Across both the OLS and IV estimates the effects of current and initial enclave size on employment status have opposite signs. Large initial enclave sizes are bad for employment, while larger current enclave populations have benefits. I investigate these parameters separately because the influence of neighbors and conationals on refugees may be different when the refugees are first introduced to their new homes than when they have lived in Denmark for some time and adjusted to their new atmospheres. I investigate possible drivers of the opposite effects.

The first mechanism that I consider is that the employment effects are driven in part by entrepreneurship. There are two facts that suggest this may be the case. First, the rates of self-employment are higher among refugees and other enclave members in larger enclaves, as can be

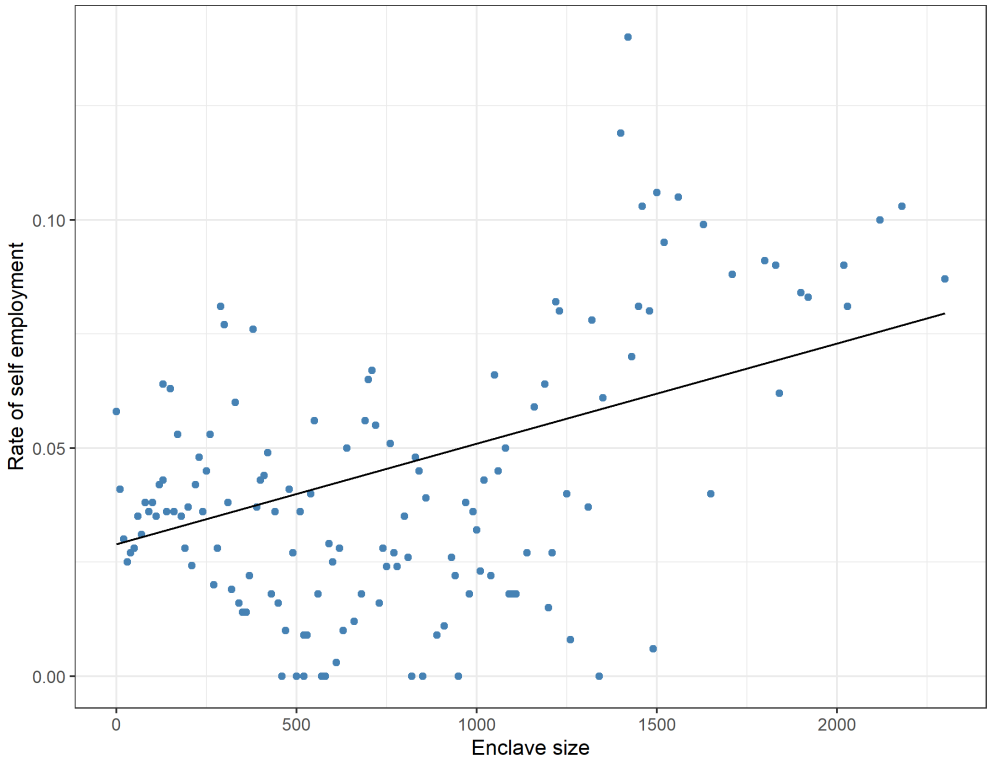
Table 5: Enclave and cohort effects

	Employment			
	(1)	(2)	(3)	(4)
S_a	-.055***		-0.061***	
	(0.003)		(0.003)	
S_t	0.120***		0.130***	
	(0.003)		(0.003)	
$S_a \leq 75$		-0.001		0.0005
		(0.015)		(0.015)
$75 < S_a \leq 600$		-0.107***		-0.101***
		(0.006)		(0.006)
$S_a > 600$		-0.051***		-0.060***
		(0.003)		(0.003)
$S_t \leq 75$		-0.049***		-0.048***
		(0.017)		(0.017)
$75 < S_t \leq 600$		0.216***		0.221***
		(0.007)		(0.007)
$S_t > 600$		0.104***		0.114***
		(0.003)		(0.003)
A_a	-0.026***		-0.018***	
	(0.001)		(0.001)	
$A_a \leq 30$		-0.023***		-0.016***
		(0.004)		(0.004)
$30 < A_a \leq 100$		-0.032***		-0.023***
		(0.002)		(0.002)
$100 <$ Own cohort		-0.005***		-0.002
		(0.002)		(0.002)
A_{a+1}			-0.010***	-0.009***
			(0.002)	(0.002)
A_{a+2}			-0.011***	-0.012***
			(0.002)	(0.002)
Constant	0.085***	0.055***	0.085***	0.053***
	(0.008)	(0.008)	(0.008)	(0.008)
Observations	235,230	235,230	235,230	235,230
R^2	0.139	0.140	0.139	0.140

Notes: *p<0.1; **p<0.05; ***p<0.01,
Standard errors are clustered at the enclave level. Enclave size and cohort size are normalized by their standard deviations. Breakpoints for piecewise linear function of initial enclave correspond to the 50th and 85th quantiles. Controls include fixed effects for year of arrival, country of origin, and municipality.

seen in Figure 2. This may be because in larger enclaves there is more demand for goods specific to ethnicities or because entrepreneurs find it more attractive to hire people from their nationality-based community to work in their businesses. Second, refugees become more likely to be self-employed with time in Denmark, as shown in Figure 3. This is true both in absolute terms, and as a fraction of total employment through their eighth year in the country. This would make sense if it takes refugees a few years to learn where there are business opportunities or to build credit before starting a company. Combining these facts suggest that it is easier for immigrants to start their own businesses in larger enclaves and that refugees are most able to take advantage of such opportunities once they have been settled for some time.

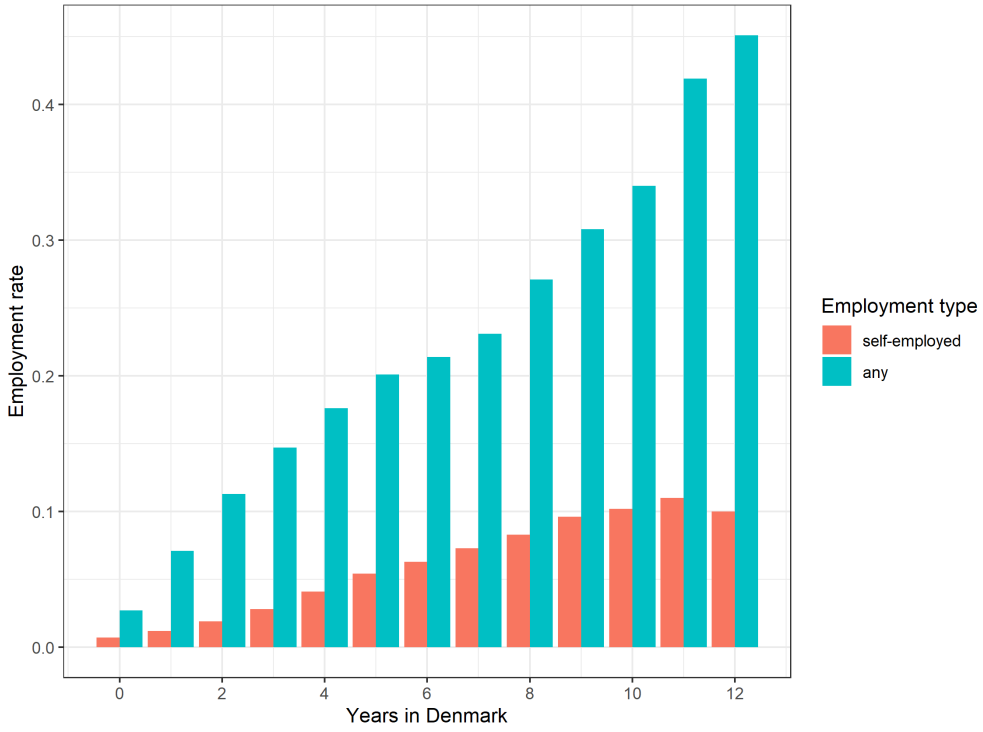
Figure 2: Enclave self-employment rates



Plotted is the rate of self employment for all enclave members, including first and second generation immigrants, against enclave population.

Another possibility is that refugees are unlikely to search for jobs in their first years because there is little expectation that they work in the early part of their residence in Denmark. Under Denmark's integration program, refugees were strongly encouraged to attend 18 months of language

Figure 3: Employment type over time



courses after their arrival and these classes were intended to take up most of their time. Therefore, holding a job was not expected in the first year and a half of residence. Additionally, Danish welfare benefits are generous, which may have dissuaded refugees from searching for a job immediately. If refugees are not engaged in a job search early on, then one would not expect their initial enclave to be the relevant job finding network. They may, however, still benefit from larger enclaves later on.

It is also conceivable that negative influences of enclaves could be playing a role. Refugees and immigrants do tend to have lower rates of employment, lower education levels, and higher crimes rates than Denmark as a whole. If refugees are more susceptible to detrimental social effects such as this early on when they are more vulnerable, then such negative social interactions could be driving the negative effect of initial enclave size on employment. If this were the case, then you might expect to see that larger initial enclave size increase crime rates, but this is not the case. Placements of refugees have negative or zero impact on criminal convictions (see Table A.7 in the Appendix).

6 Employment-improving placement

In the previous section, I obtained estimates describing the impact of the dispersal program on refugees' employment status for the twelve years following asylum. Next, I use this information to characterize the allocation of refugees over enclaves and time that maximizes refugee employment, subject to constraints that match Denmark's political goals at the time. The goal is to obtain some guidance for how resettlement agencies should place refugees across the cities in their countries.

6.1 Optimization problem

I consider a porblem in which the objective is to maximize the total number of periods that refugees spend employed over time horizon $T = 10$ years, subject to the restriction that proportional distribution be maintained. I solve for the constrained optimal method of placing the refugees who arrived in Denmark over the period 1986-1998. To implement the proportional distribution restriction, I require that the number of refugees allocated to each municipality be the same as the number who were actually sent to each municipality. This means that I am altering the composition by country of the refugees in each city and the timing of when they are placed.

I make this restriction for several reasons. The primary purpose is to respect Denmark's goal of even distribution of refugees, in particular the goal of spreading public resource use more broadly. Second, the decision helps avoid issues related to spillover effects from the refugees into the broader labor market. By holding fixed the total quantity of new refugee labor introduced, I can abstract from any issues that may be caused by introducing larger numbers of people searching for jobs into a labor market. If refugees from different countries are relatively substitutable in the municipality labor market, then changing the compostition but not the number of people placed should not have much impact on wages or non-refugee employment rates.

Setting a limit on the total number of refugees to be settled in each municipality also conveniently simplifies the optimization problem. Maximization can now be done at the municipality

level, rather than across all municipalities at once, reducing the dimension of the problem. This is helpful because the objective function is quadratic and non-convex due to the inclusion of piecewise linear functions of cohort and enclave size.

The problem is solved in two stages. First, optimal placement over time is calculated for every total number of refugees, N_c, to be assigned to an enclave c. Based on the optimal placement flow, expected employment can be obtained for every N_c. This results in some employment-optimal enclave size which can be targeted in order to determine how many enclaves each municipality should have—many small or a few large?—to achieve the constrained highest expected total employment.

To define the objective function, begin with expected employment for refugee i in year t who is settled in year a. Dropping the municipality index for convenience, the probability of employment is

$$\mathrm{E}[Y_{itac}] = \alpha + \beta_0 S_{ac} + \beta_1 S_{tc} + \xi X_i + \sum_{j=0}^{2} \lambda_j A_{a+j,c} \tag{11}$$

Summing over the the T year horizon, expected total years of employment is given by

$$\mathrm{E}[Y_{iac}] = T\alpha + T\beta_0 S_{ac} + \beta_1 \sum_{j=0}^{T-1} S_{a+j,c} + T\xi X_i + \sum_{j=0}^{2} \lambda_j (T-j) A_{a+j,c} \tag{12}$$

Therefore, total expected employment for the cohort that arrives in year a and is of size A_a is

$$\mathrm{E}[Y_{ac}] \;=\; A_{ac} \times \left(T\alpha \;+\; T\beta_0 S_{ac} \;+\; \beta_1 \sum_{j=0}^{T-1} S_{a+j,c} \;+\; \sum_{i} T\xi X_i \;+\; \sum_{j=0}^{2} \lambda_j (T \;-\; j) A_{a+j,c} \right) \tag{13}$$

Summing over all cohorts to be placed in an enclave, expected enclave employment is

$$\mathrm{E}[Y_c] \;=\; \sum_k A_{kc} \times \left(T\alpha \;+\; T\beta_0 S_{kc} \;+\; \beta_1 \sum_{j=0}^{T-1} S_{k+j,c} \;+\; \sum_i T\xi X_i \;+\; \sum_{j=0}^{2} \lambda_j (T \;-\; j) A_{k+j,c} \right) \quad (14)$$

Since the problem can be broken down to the municipality level, the optimization problem is then

$$\max_{\overrightarrow{A_c}} \sum_c \sum_k A_{kc} \times \left(T\alpha \;+\; T\beta_0 S_{kc} \;+\; \beta_1 \sum_{j=0}^{T-1} S_{k+j,c} \;+\; \sum_i T\xi X_i \;+\; \sum_{j=0}^{2} \lambda_j (T \;-\; j) A_{k+j,c} \right) \quad (15)$$

$$\text{s.t.} \quad \sum_c \sum_k A_{kc} = N$$

$$S_{tc} = \alpha^0 + \sum_{j=0}^{t-1} \pi_j A_{t-j}$$

Where the coefficients for the enclave size constraint come from the first stage estimation which regressed enclave size on lags of assigned refugees.

As discussed earlier, I break this problem into two parts. Rather than solving for the optimal way to place N_m refugees in each municipality m by solving equation (15), I instead maximize equation (14) s.t. $\sum_k A_{kc} = N$ across values of N, and then identify the optimal enclave size, N^*, which maximizes expected employment under an optimal placement pattern. Because the objective function consists of individual probability of employment multiplied by cohort size, the objective is quadratic. And, since I allowed for non-linear functions of cohort size, it is also non-convex. I therefore use the quadratic solver from Gurobi in order to obtain the solution.

6.2 Employment results

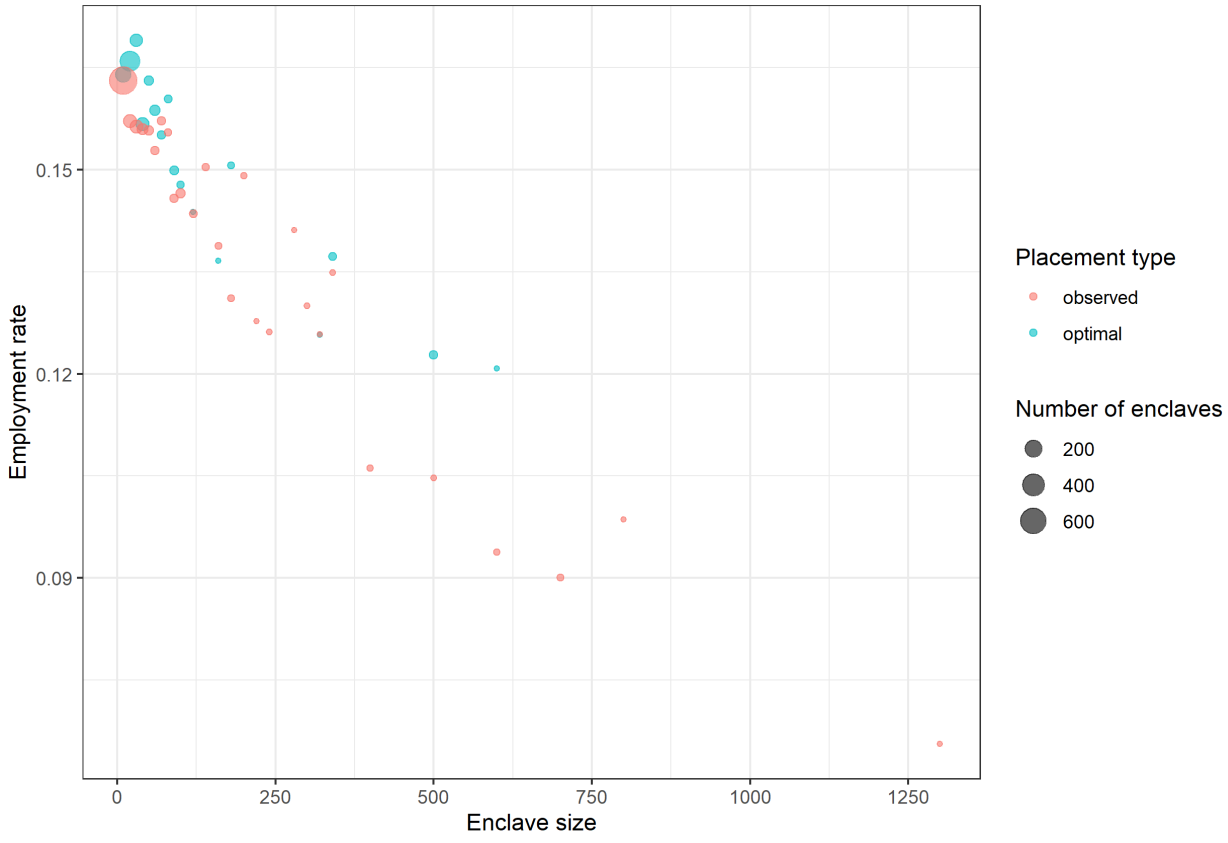
I find that for all target numbers of refugees to be placed in an enclave, it is optimal from an employment standpoint to place them evenly over time. For example, if 100 refugees need to be settled in an enclave over 10 years, then 10 refugees should be placed in each year. The median refugee is placed in an enclave along with 104 other refugees over the course of the dispersal period. Placing these refugees in cohorts of eight or nine reufgees over 12 years would result in expected employment 5 percentage points higher than if the refugees were all placed in the same year. Figure A.7 in the Appendix contains information about employment rates predicted under additional placement trajectories.

Further, it is best to create relatively small enclaves, with the highest expected employment rate achieved when 30 refugees are placed in an enclave over the 12 years of the dispersal period. Therefore, the employment-maximizing placement plan involves creating enclaves in which up to 30 refugees are placed when the total number to be sent to a municpality is less than or equal to 240, and eight evenly sized enclaves when the total number to be placed is more than 240. These refugees should be settled in equally sized cohorts over the full range of the dispersal period. This strategy is driven primarily by the negative effects of cohort size. The crowding out effects of people placed around the same time dominate such that it is most beneficial to place cohorts of refugees that are as small as possible. This together with the detrimental effects of initial enclave size outweigh the positive effects of current enclave size such that it is optimal to settle small numbers of refugees in each enclave.

To understand the effects of altering the placement of refugees, I simulate employment for each refugee using the first and second stage linear estimates under the actual dispersal policy and the proposed dispersal policy. Placing refugees according to this plan, as opposed to the method in which they were settled in reality, would have increased emloyment by an expected 9.7%, from 13.3% over ten years to 14.6%. This gain is modest, but suggests that Denmark placed refugees in a way that is close to optimal, given the other political goals the Refugee Council faced.

As illustrated in Figure 4, the employment gains stem from two sources. First, by placing refugees smoothly over time, expected employment is higher, particularly in relatively small enclaves than it was under the more sporadic placement that occurred in reality. This can be seen by the vertical gap between the blue and red dots. This distance is the difference between expected employment under smooth placement as opposed to the realized placement pattern for a fixed total number of refugees assigned to an enclave. Second, under both optimal and actual placement, refugees have higher expected employment when settled in smaller numbers. Shifting more of the refugees into smaller enclaves, represented by a higher concentration of blue dots in the left side of the plot, results in higher overall employment rates.

Figure 4: Enclave employment rates: proposed vs. actual placement



A back of the envelope calculation suggests that improved placement would also save money. Among the 32,518 refugees placed between 1986 and 1998, expected total employment over the first

ten years in Denmark for each refugee would be expected to rise from 43,249 to 47,476 years. In my sample, refugees who are employed pay an average of DKK 68,869 in taxes while refugees who are unemployed pay DKK 21,165, all in present day values. Meanwhile, employed refugees receive on average DKK 40,181 in transfers while unemployed refugees receive DKK 102,827. Assuming that the refugees who are shifted into employment by the change in assignment would have similar earnings potentials as those who are employed in reality, this would result in an overall DKK 465,688,590, or $69,853,289 reduciton in the government's cost of hosting refugees. This is likely underestimated because it does not include changes to the funding of other public programs that may be under less pressure if more refugees work or to benefits that are paid to the refugees' children who may be more likely work and achieve higher education levels if their parents are employed.

7 Conclusion

The choice of settlement location made by refugee-accepting countries or settlement agencies is an important one as it has effects on labor market outcomes for refugees. In this paper, I find that characteristics of the locations to which refugees are sent and the timing of the dispersal policy have significant effects on refugee employment. Refugees compete with each other in the early years of residence in a new country, but larger enclave populations are beneficial later on. I also find evidence of non-linearity in the effect of enclave size. Using this information, I obtain the refugee employment-maximizing resettlement plan, which is characterized by smooth and widely dispersed placement. I find that settlement of refugees in accordance with this plan would have improved their employment by 9.7% relative to the employment attained under the implemented dispersal policy.

References

Ahani, Narges, Tommy Andersson, et al. (2021). "Placement optimization in refugee resettlement". In: *Operations Research*.

Ahani, Narges, Paul Gölz, et al. (July 2021). "Dynamic Placement in Refugee Resettlement". In: *Proceedings of the 22nd ACM Conference on Economics and Computation*. Ed. by Péter Biró. ACM. ISBN: 978-1-4503-8554-1. DOI: 10.1145/3465456.3467534.

Bansak, Kirk et al. (2018). "Improving refugee integration through data-driven algorithmic assignment". In: *Science* 359.6373, pp. 325–329.

Beaman, Lori A. (2012). "Social Networks and the Dynamics of Labor Market Outcomes: Evidence from Refugees Resettled in the U.S." In: *Review of Economic Studies* 79.1, pp. 128–161.

Cutler, David M. and Edward L. Glaeser (1997). "Are ghettos good or bad?" In: *The Quarterly Journal of Economics* 3, pp. 827–872.

Cutler, David M., Edward L. Glaeser, and Jacob L. Vigdor (2008). "When are ghettos bad? Lessons from immigrant segregation in the United States". In: *Journal of Urban Economics* 63, pp. 759–774.

Dagnelie, Olivier, Anna Maria Mayda, and Jean-François Maystadt (2019). "The labor market integration of refugees in the United States: Do entrepreneurs in the network help?" In: *European Economic Review* 111, pp. 257–272.

Damm, Anna Piil (2005). *The Danish dispersal policy on refugee immigrants 1986-1998: a natural experiment?* Working Paper 05-3. Aarhus School of Business.

— (2009). "Ethnic Enclaves and Immigrant Labor Market Outcomes: Quasi-Experimental Evidence". In: *Journal of Labor Economics* 27.2, pp. 281–314.

— (2014). "Neighborhood Quality and Labor Market outcomes: Evidence from Quasi-random Neighborhood Assignment of Immigrants". In: *Journal of Urban Economics* 79, pp. 139–166.

Edin, Per-Anders, Peter Fredriksson, and Olof Åslund (2003). "Ethnic Enclaves and the Economic Success of Immigrants —Evidence from a Natural Experiment". In: *Quarterly Journal of Economics* 118.1, pp. 329–357.

Larsen, Birgitte Romme (2011). "Becoming part of welfare Scandinavia: integration through the spatial dispersal of newly arrived refugees in Denmark". In: *Journal of Ethnic and Migration Studies* 37.2, pp. 333–350.

Refugee Processing Center (2021). *Summary of Refugee Admissions*. Tech. rep. Bureau of Population, Refugees, and Migration, Department of State.

The World Bank Group (2022). *World Development Indicators*. https://www.https://data.worldbank.org/indicator/. (Visited on 04/14/2022).

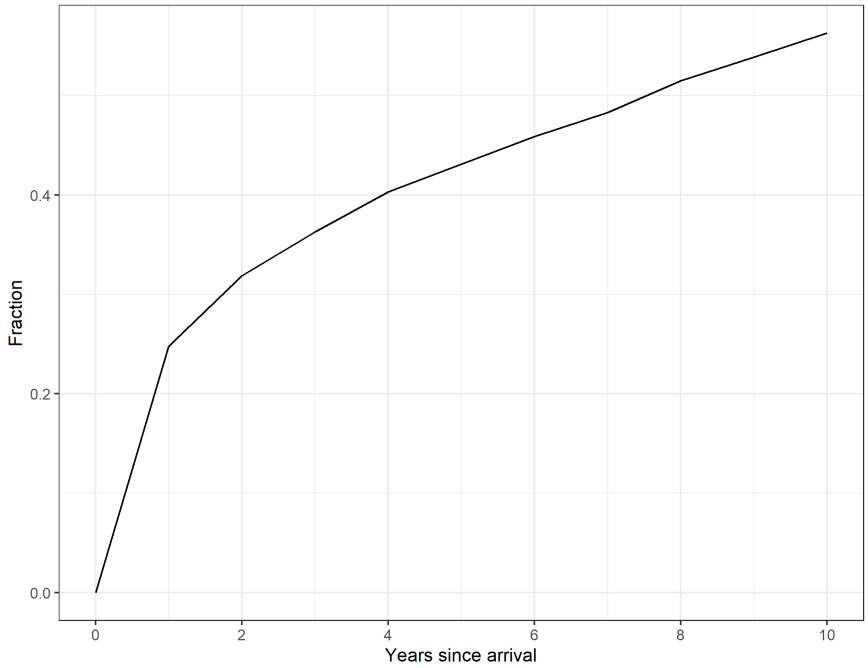
United Nations High Commissioner for Refugees (2001). *Asylum applications in industrialized countries: 1990:1999*. https://www.unhcr.org/3c3eb40f4.pdf. Accessed: 2021-09-27.

USA for UNHCR (2021). *How many refugees are fleeing the crisis in Afghanistan?* https://www.unrefugees.org/news/how-many-refugees-are-fleeing-the-crisis-in-afghanistan/. (Visited on 11/17/2021).

Wahba, Jackline and Yves Zenou (2005). "Density, social networks, and job search methods: theory and application to Egypt". In: *Journal of Development Economics* 78, pp. 443–473.

A Data

Figure A.1: Refugee moves



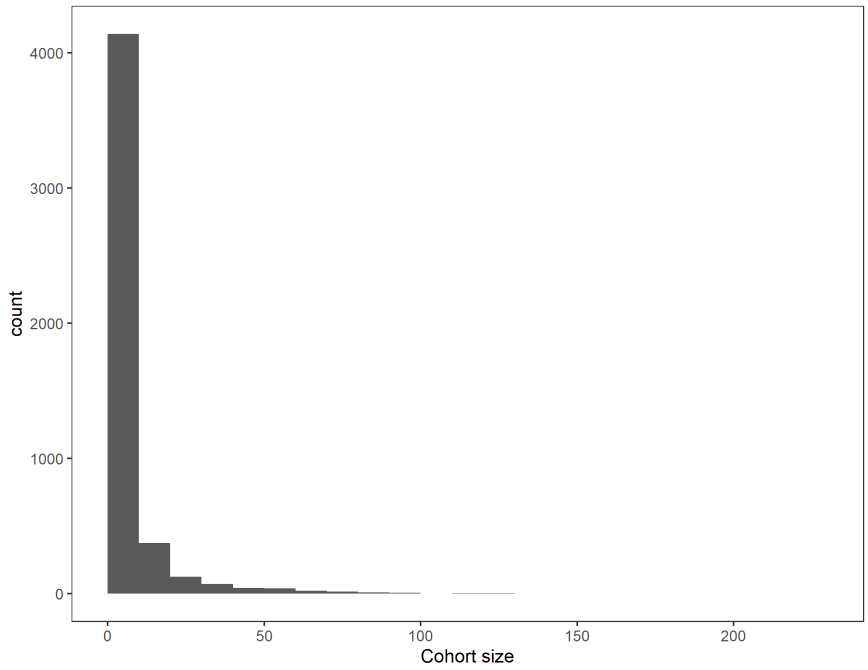
The move rate is calculated as the fraction of refugees who live in a different municipality than the one in which they were first settled.

B Random assignment

B.1 Assignment mechanism

The details of Denmark's 1986-1998 spatial dispersal policy for refugees are documented by Damm (2005). All refugees who could not find housing on their own were assigned to locations for permanent housing by the Refugee Council who made these decisions based on a limited set of demographic information and had a goal of settling refugees geographically in proportion to the existing Danish population. The demographic variables may have been used in order to ensure that adequate resources and public housing were available for the refugees sent to each municipality. This policy creates conditional random variation in the enclave population that each refugee is exposed

Figure A.2: Distribution of cohort size



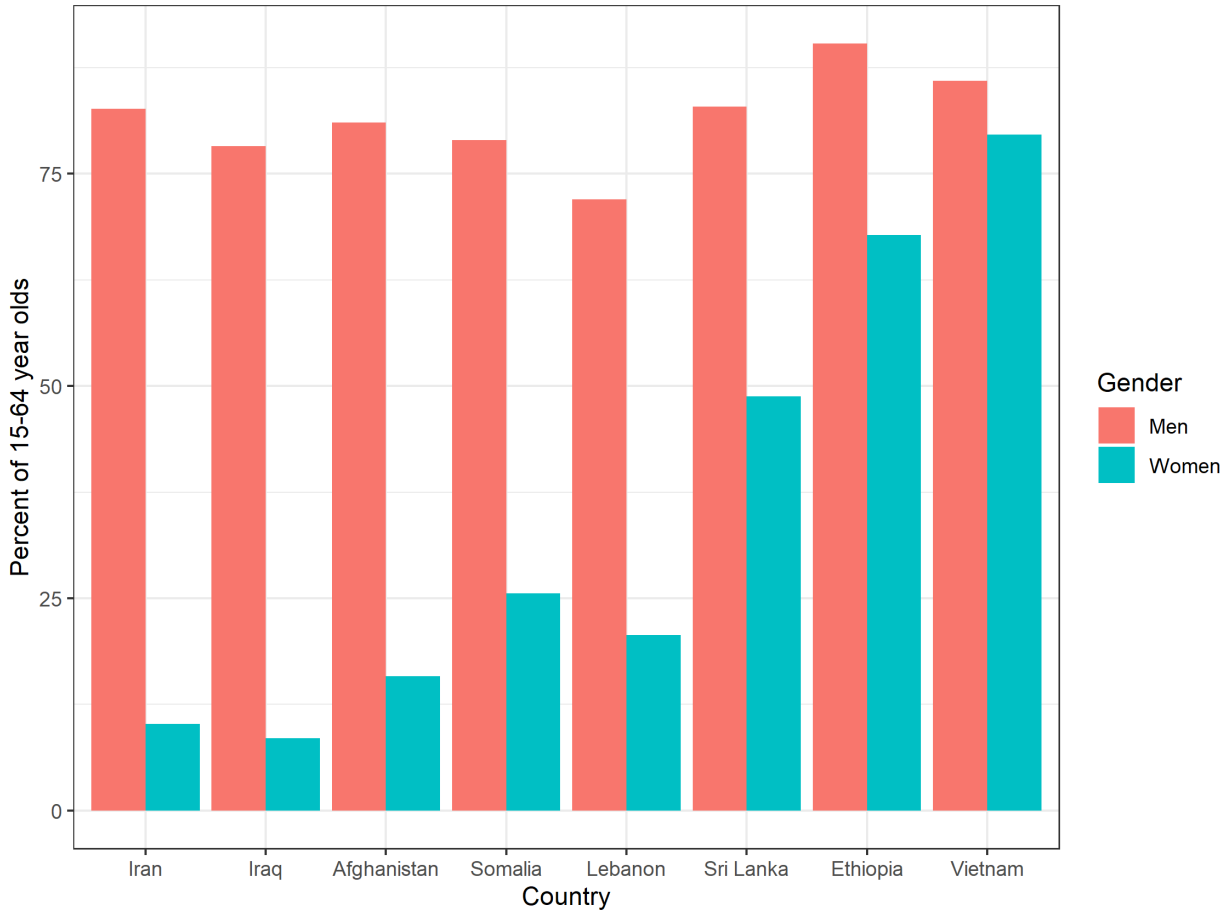
The level of observation is the cohort: all refugees from the same country placed in the same municipality in the same year.

to and in the size of cohorts that are assigned to each enclave. In the following simplified model, I demonstrate conditions under which this conditional random assignment holds.

In the simplified assignment model, I assume that the Council is responsible for assigning refugees from two countries, $c \in \{a, b\}$ to two municipalities, $m \in \{j, k\}$ over two years, $t \in \{1, 2\}$. Even dispersal requires that the council target sending fraction α of the refugees to municipality j. Suppose also that refugees are differentiated by one trait, $X \in \{0, 1\}$, where refugees with $X = 1$ have specific housing requirements. Municipalities j, k can each accommodate fraction π_j, π_k of the refugees they receive having $X = 1$. I assume that the Council assigns all refugees who arrive in a given period simultaneously, with assignment for each refugee i being a draw from a probability distribution that depends on X_i.

Suppose that $N_{1a} + N_{1b} = N_1$ refugees arrive in Denmark in year 1, from countries a and b. Fraction ρ_1 of the refugees have $X = 1$, with ρ_{1a}, ρ_{1b} being the rates for each country. If π_j, π_k are sufficiently large, then bounds can be set on the probability that each demographic type will

Figure A.3: Labor force participation rates



Plotted are estimated labor force participation rates by gender for each country in the year 1990. Source: The World Bank Group (2022)

be sent to the municipalities. If all possible $X = 1$ refugees are sent to municipality j, then the probability that a refugees with $X = 1$ will be sent to municipality j is $\alpha\pi_j$ and the probabilty an $X = 0$ will be sent to j is $\alpha(1-\pi_j)$. On the other hand, if as many refugees with $X = 1$ are sent to k, then the probability that type 1 is sent to k is $(1-\alpha)\pi_k$ and the probability that type 0 is sent to k is $(1-\alpha)(1-\pi_k)$. This sets bounds on the probability that each type of refugee is assigned to each municipality. Suppose the Council decides on probabilities p_{01}, p_{11} that type 0 and 1 are sent to municipality j in the first year. In period 1, conditional on X, individuals are randomly assigned to municipalities. In period 2, the same logic holds, although the levels of p_0, p_1 may have to be adjusted if the target share of refugees between municipalities j and k was not met. This means that conditional on X and the year of arrival, each refugee has an equal chance of being sent to

each municipality, and so $S_{acm}, S_{tcm} \big| X, a \perp\!\!\!\perp \epsilon_{it}$, which is the condition required for estimation of B_0, and B_1.

The second component of randomness is in the size of the cohorts that are assigned to each enclave. Let ρ_{1a}, ρ_{1b} be the share of refugees from countries a and b with $X = 1$. Then the expected cohort size in year 1 for municipaltiy j is $N_c \times \big(p_{11} \times \rho_{1c} + p_{01} \times (1 - \rho_{1c})\big)$, which depends on the demographics of the refugees who arrived in that year and on the capacity of the municipality to receive $X = 1$ refugees, which impact p. Conditioning on the year and the municipality account for these variables. In the second period, if the realized fraction sent to j was different from α, then $p_{11} \neq p_{12}$ and $p_{01} \neq p_{02}$. Thus, the expected cohort size depends on the number of refugees that have been assigned to the municipality in the past. After conditioning on the municipality, the year, and the number of refugees the municipality has already received, the cohort size will be independent of the enclave labor market quality, which is the requirement for estimation of β_0 and β_1

B.2 Verification

I find that the share of a municipality m's assigned refugees that originate from country c, $\frac{\sum_t A_{tcm}}{\sum_j \sum_t A_{tjm}}$, is uncorrelated with the pre-dispersal policy employment rate for enclave cm. This is evidence in support of the assumption that the Refugee Council's decision of how many refugees from each country to send to municipalities was not made based on country-specific employment opportunities. It is therefore unlikely that the Council would be able to project the future labor market conditions faced by particular enclaves and adjust flows of refugees accordingly to improve employment.

C First stage results

I use an instrumental variables strategy to estimate β_0, β_1. In the first stage, I regress the size of the refugee's initial enclave in the year of arrival and the year in which employment is measured on

Table A.1: Random assignment check

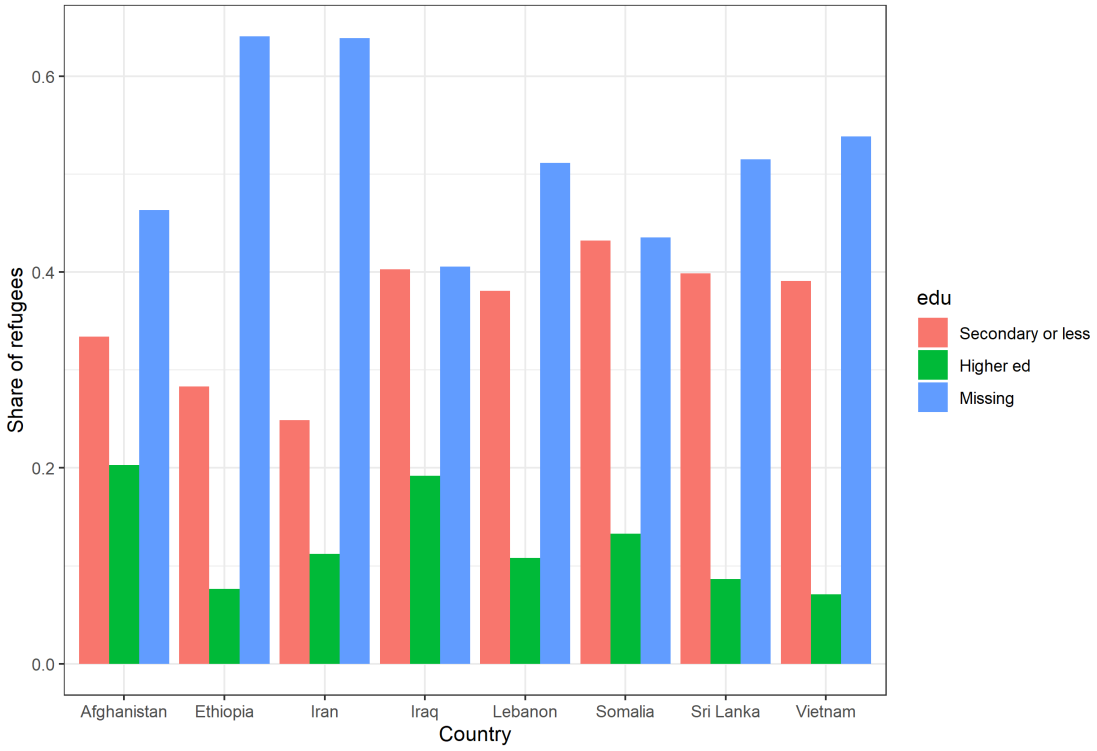
	Municipality pop.	Enclave pop.	Immigrant share	Immigrant employment
	(1)	(2)	(3)	(4)
Higher Ed.	-438.9	-10.653	0.001	0.001
	(2732.6)	(12.705)	(0.001)	(0.001)
Male	-18,622.790***	-77.208***	-0.005***	-0.003***
	(2,671.947)	(12.359)	(0.001)	(0.001)
Married	-12,331.790***	-2.551	-0.003***	-0.003***
	(2,871.185)	(13.281)	(0.001)	(0.001)
Age 18-39	18,717.280***	73.874***	0.004***	0.004**
	(4,145.050)	(19.173)	(0.001)	(0.002)
Constant	213,261.900***	-256.651***	0.057***	0.124***
	(12,832.870)	(59.358)	(0.003)	(0.006)
Observations	16,210	16,210	16,210	16,210
R^2	0.079	0.170	0.225	0.115

Notes: *p<0.1; **p<0.05; ***p<0.01,
Additional controls for country, year of arrival, and demographics of refugees who arrive in the same year are included.
Higher education includes college and graduate degrees

Table A.2: 1985 enclave employment and enclave share of municipal refugee assignments

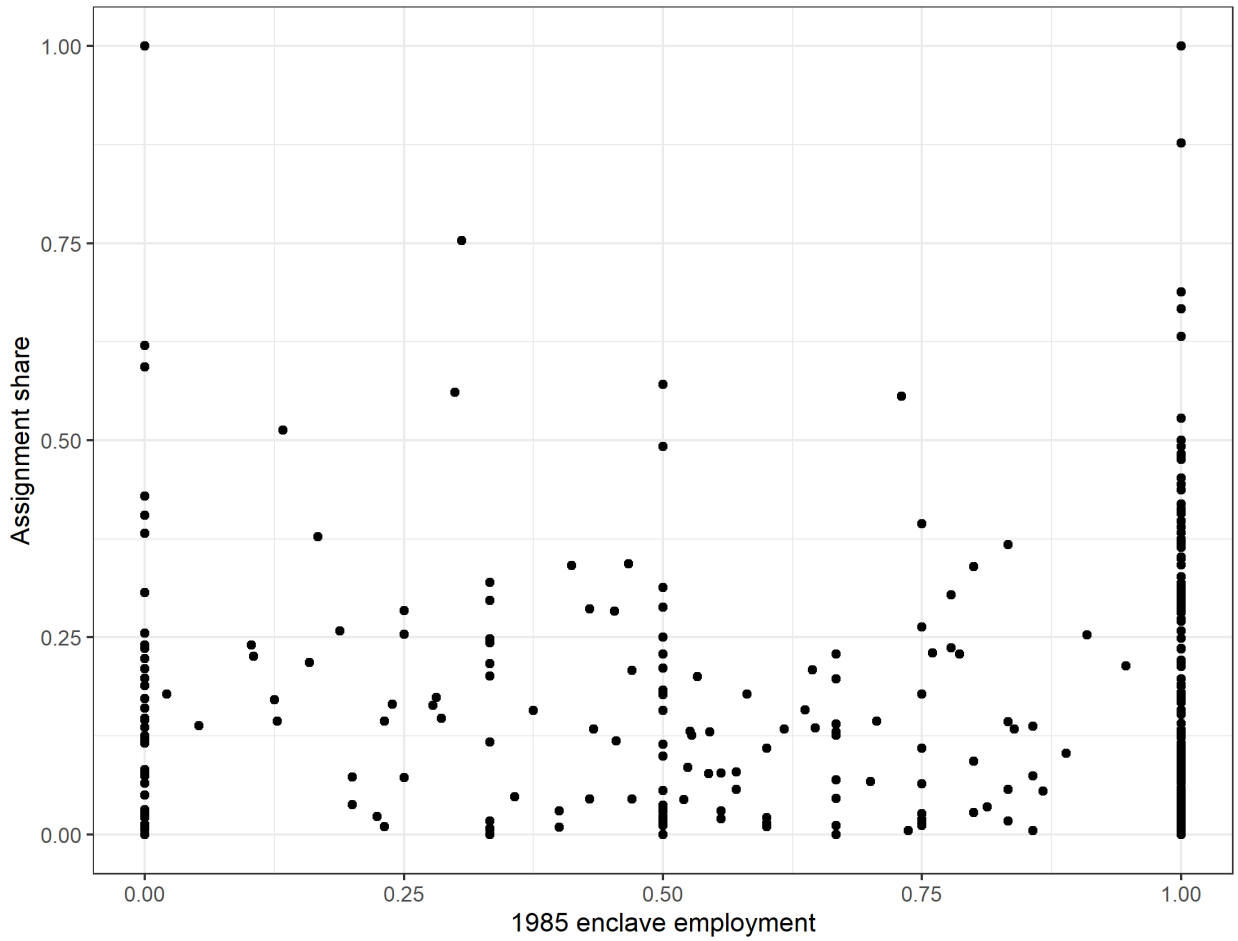
	Enclave share of arrivals
	(1)
Employment rate	0.010
	(0.025)
Constant	0.145***
	(0.018)
Observations	395
R^2	0.0005
Note:	*p<0.1; **p<0.05; ***p<0.01

Figure A.4: Pre-arrival educational attainment



the lags of refugees assigned to that enclave, controlling for refugee demographics. The first stage results are contained in Table A.3. As expected, the coefficients on lags of placement are positive and significant. All are greater than 1, meaning that placing one refugee results in more than one additional enclave resident in the future. This may be because A_t only denotes the refugees who are randomly placed, but they may have family who follows them. Another possibility is that larger enclaves draw more migrants, and so when more refugees are placed in an area, more immigrants and refugees will move to that location.

Figure A.5: Pre-dispersal enclave employment vs enclave share of assignments



The x-axis plots the 1985 enclave employment rate among working age residents. The y-axis plots the share of the total refugees assigned to the municipality during the dispersal policy that originate from the country associated with that enclave.

Table A.3: First stage estimates

	Enclave size	
	Initial	Current
	(1)	(2)
A_t		1.405***
		(0.140)
A_{t-1}	2.733***	1.453***
	(0.444)	(0.106)
A_{t-2}	2.681***	1.111***
	(0.693)	(0.169)
A_{t-3}	1.666**	2.356***
	(0.772)	(0.411)
A_{t-4}	1.270	2.312***
	(0.900)	(0.234)
A_{t-5}	3.281***	2.266***
	(0.773)	(0.241)
A_{t-6}	3.016***	1.962***
	(0.552)	(0.203)
A_{t-7}	2.064***	2.434***
	(0.829)	(0.466)
A_{t-8}	2.992***	2.545***
	(0.732)	(0.512)
A_{t-9}	0.174	2.357***
	(0.760)	(0.541)
A_{t-10}	2.157***	2.746***
	(0.252)	(0.886)
A_{t-11}	1.617***	3.001***
	(0.121)	(0.572)
A_{t-12}	2.862***	3.035***
	(2.862)	(0.330)
Constant	120.808***	235.885
	(25.733)	(188.902)

Notes: *p<0.1; **p<0.05; ***p<0.01,
Standard errors are clustered at the enclave level. Unlike in other specifications, enclave size is not normalized by its standard deviation. Controls include gender, marital status at arrival, age at arrival, as well as country, year of arrival, and municipality fixed effects.

D Robustness Checks

D.1 Results excluding Copenhagen

Copenhagen is the city to which the largest number of refugees are assigned and where prior to the start of the dispersal program in 1986, the majority of refugees chose to live. In this subsection, I reproduce the main results excluding the refugees who were assigned to Copenhagen. Generally, the estimated parameters are similar in magnitude and sign to those estimated with Copenhagen included, with a few exceptions in the results including the size of time neighboring cohorts, found in Table A.6. In this set of estimates, the effects of current and initial enclave sizes below the median differ. In the main estimates, the effect of increasing initial enclave size for enclaves below the median of 75 members is statistically insignificant, but when Copenhagen is excluded, the effect is negative, putting the impact more in line with the effects of increasing initial enclave size at other enclave levels. The effect of current enclave size for enclaves below the median is negative when all municipalities are included, but smaller in magnitude and insignificant with Copenhagen excluded. Finally, without the capitol city, the effects of increasing cohort size above 100 refugees is small and positive, rather than negative or insignificant as in the specifications with refugees placed in Copenhagen.

D.2 Crime

When considering the impacts of enclaves, a concern beyond employment of refugees may be the relationship between the concentration of immigrants and crime rates. Danish authorities have viewed this as a problem and have taken steps to crack down on crime in neighborhoods composed primarily of non-native Danes. Refugees do have overall higher crime rates than native-born Danes. I investigate the impact of enclave size and placements of refugees on refugee crime rates. It is valuable to understand what the impact of changing the assignment of refugees to enclaves will be on crime rates. I regress the number of annual criminal convictions at the individual level on

Table A.4: Effect of being placed in larger enclave, excluding Copenhagen

	Employment			
	(1)	(2)	(3)	(4)
S_a	0.007***		-0.062***	
	(0.002)		(0.003)	
$S_a \leq 75$		0.118***		-0.238***
		(0.022)		(0.035)
$75 < S_a \leq 600$		-0.006		-0.126***
		(0.005)		(0.007)
$S_a > 600$		0.010***		-0.042***
		(0.003)		(0.004)
S_t			0.128***	
			(0.004)	
$S_t \leq 75$				0.352***
				(0.044)
$75 < S_t \leq 600$				0.189***
				(0.009)
$S_t > 600$				0.102***
				(0.005)
Male	0.096***	0.097***	0.096***	0.095***
	(0.002)	(0.002)	(0.002)	(0.002)
Married	-0.045***	-0.045***	-0.042***	-0.042***
	(0.002)	(0.002)	(0.002)	(0.002)
Age 18-39	0.102***	0.102***	0.112***	0.112***
	(0.002)	(0.002)	(0.003)	(0.003)
Constant	-0.110***	-0.114***	0.150***	0.134***
	(0.009)	(0.009)	(0.012)	(0.012)
Observations	210,188	210,188	210,188	210,188

Notes: *p<0.1; **p<0.05; ***p<0.01,
Standard errors are clustered at the enclave level. Enclave size is normalized by its standard deviation. Controls not shown include country of origin, year of arrival, municipality, the number of refugees previously assigned to the municipality of placement, and the number of refugees in each demographic category who arrived in the same year.

Table A.5: Effect of a change in enclave size, excluding Copenhagen

	Employment			
	(1)	(2)	(3)	(4)
S_a	-0.014***		-0.070***	
	(0.003)		(0.003)	
$S_a \leq 75$		-0.031**		0.018
		(0.012)		(0.015)
$75 < S_a \leq 600$		-0.011**		-0.105***
		(0.005)		(0.007)
$S_a > 600$		-0.015***		-0.062***
		(0.004)		(0.005)
S_t			0.154***	
			(0.004)	
$S_t \leq 75$				-0.063***
				(0.020)
$75 < S_t \leq 600$				0.200***
				(0.008)
$S_t > 600$				0.144***
				(0.006)
Male	0.094***	0.094***	0.096***	0.096***
	(0.002)	(0.002)	(0.002)	(0.002)
Married	-0.038***	-0.038***	-0.042***	-0.042***
	(0.002)	(0.002)	(0.002)	(0.002)
18-39	0.110***	0.110***	0.112***	0.112***
	(0.003)	(0.003)	(0.003)	(0.003)
Constant	0.118***	0.118***	0.158***	0.161***
	(0.011)	(0.011)	(0.012)	(0.012)
Observations	210,188	210,188	210,188	210,188

Notes: *p<0.1; **p<0.05; ***p<0.01,
Standard errors are clustered at the enclave level. Enclave size is normalized by its standard deviation. Controls not shown include country of origin, year of arrival, municipality, the number of refugees previously assigned to the municipality of placement, and the number of refugees in each demographic category who arrived in the same year.

Table A.6: Enclave and cohort effects, excluding Copenhagen

	Employment			
	(1)	(2)	(3)	(4)
S_a	-.076***		-0.087***	
	(0.003)		(0.004)	
S_t	0.183***		0.202***	
	(0.004)		(0.005)	
$S_a \leq 75$		-0.033**		-0.036***
		(0.015)		(0.015)
$75 < S_a \leq 600$		-0.110***		-0.108***
		(0.007)		(0.007)
$S_a > 600$		-0.066***		-0.085***
		(0.005)		(0.005)
$S_t \leq 75$		-0.018		-0.027
		(0.021)		(0.021)
$75 < S_t \leq 600$		0.239***		0.257***
		(0.008)		(0.008)
$S_t > 600$		0.163***		0.180***
		(0.007)		(0.007)
A_a	-0.029***		-0.020***	
	(0.002)		(0.002)	
$A_a \leq 30$		-0.025***		-0.016***
		(0.005)		(0.005)
$30 < A_a \leq 100$		-0.036***		-0.026***
		(0.003)		(0.003)
100 < Own cohort		0.006**		0.007***
		(0.003)		(0.003)
A_{a+1}			-0.018***	-0.018***
			(0.002)	(0.002)
A_{a+2}			-0.013***	-0.012***
			(0.002)	(0.002)
Constant	0.166***	0.167***	0.155***	0.158***
	(0.012)	(0.012)	(0.012)	(0.012)
Observations	210,188	210,188	210,188	210,188
R^2	0.143	0.143	0.143	0.144

Notes: *p<0.1; **p<0.05; ***p<0.01,
Standard errors are clustered at the enclave level. Enclave size and cohort size are normalized by their standard deviations. Breakpoints for piecewise linear function of initial enclave correspond to the 50th and 85th quantiles. Controls include fixed effects for year of arrival, country of origin, and municipality.

the lags of past assignments to the enclave. The results are in Table A.7. For all types of crime, lags of arrivals have no statistically significant effect on crime. The number of refugees assigned in the current year does have a negative effect on crime rates. This is likely driven by the fact that refugees are very unlikely to commit crimes in their first year of residence in Denmark.

E Improved assignment

Figure A.6 shows the expected enclave employment rate against the number of refugees assigned to an enclave when assignment is smooth over time. Expected employment is decreasing in the number of refugees who are placed. Figure A.7 shows how expected employment changes depending on the size and pattern of the cohorts that are placed. Plotted is the predicted employment rate for various ways to place 105 refugees, the number sent to an enclave that the median refugee is exposed to. The first 4 bars represent employment when refugees are placed in equally sized cohorts in 1, 2, 3, and 4 consecutive years, as might be done if the settlement agency were to focus intensively on several cities to place refugees, then move on. The fifth column represents placing the refugees in equally sized cohorts in alternating years, and the last column represents equal placement over all possible years, achieving the highest expected employment rate.

Table A.7: Effect of placements on crime

	Per capita crime		
	All crime	Violent crime	Property crime
	(1)	(2)	(3)
Arrivals t	-8.987e-4***	-1.492e-4*	-4.287e-4***
	(2.658e-4)	(8.060e-5)	(1.620e-4)
Arrivals $t-1$	-3.160e-4	-1.340e-5	-1.175e-4
	(3.199e-4)	(9.702e-5)	(1.950e-4)
Arrivals $t-2$	-2.904e-5	-3.658e-5	-1.192e-5
	(3.426e-4)	(1.039e-4)	(2.088e-4)
Arrivals $t-3$	-2.2904e-5	6.862e-6	-9.536e-5
	(3.507e-4)	(1.064e-4)	(2.138e-4)
Arrivals $t-4$	-1.581e-4	-3.150e-6	-1.454e-4
	(4.112e-4)	(1.247e-4)	(2.507e-4)
Arrivals $t-5$	-3.355e-5	-3.123e-5	8.919e-5
	(4.234e-4)	(1.284e-4)	(2.581e-4)
Arrivals $t-6$	-3.714e-4	-1.054e-5	-1.358e-4
	(4.308e-4)	(1.306e-4)	(2.626e-4)
Arrivals $t-7$	-3.179e-4	-8.748e-5	-1.667e-4
	(4.471e-4)	(1.356e-4)	(2.726e-4)
Arrivals $t-8$	-2.338e-4	-2.838e-5	2.484e-5
	(4.705e-4)	(1.427e-4)	(2.868e-4)
Arrivals $t-9$	-4.820e-4	5.659e-5	-2.871e-4
	(4.946e-4)	(1.500e-4)	(3.015e-4)
Arrivals $t-10$	3.093e-5	-2.449e-5	-3.681e-5
	(5.132e-4)	(1.556e-4)	(3.129e-4)
Arrivals $t-11$	-7.098e-4	-1.879e-4	-1.315e-4
	(5.549e-4)	(1.683e-4)	(3.386e-4)
Arrivals $t-12$	-7.054e-5	-1.503e-5	-4.945e-5
	(5.390e-4)	(1.635e-4)	(3.286e-4)
Constant	0.114	-4.422e-3	5.234e-2
	(0.283)	(8.586e-2)	(1.726e-1)

Notes: *p<0.1; **p<0.05; ***p<0.01,
Standard errors are clustered at the enclave level.

Figure A.6: Expected employment under smooth placement

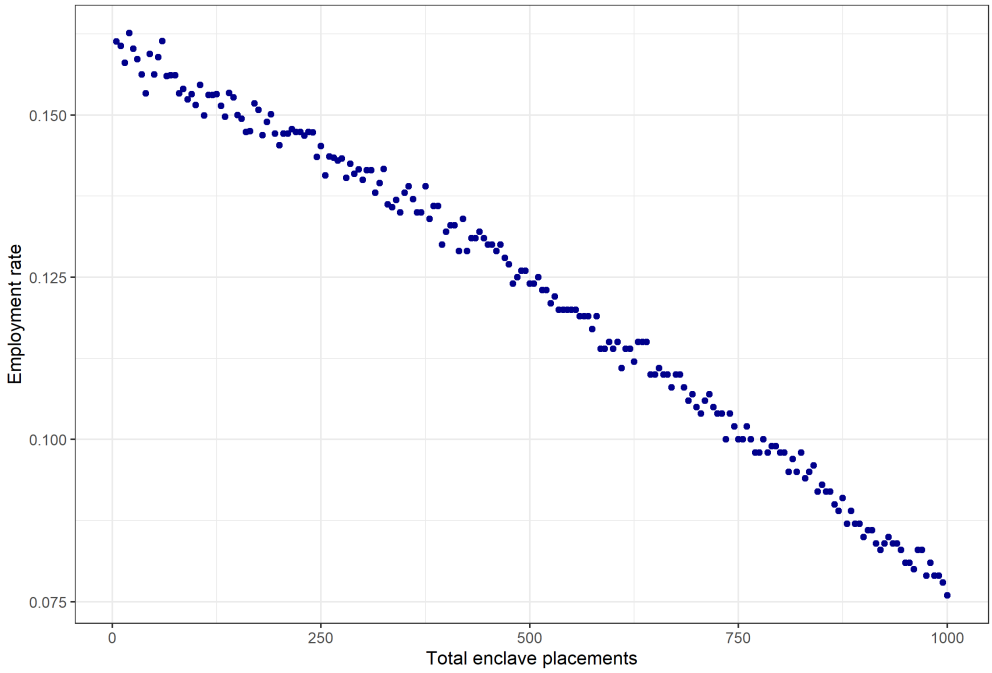


Figure A.7: Impact of placement pattern on employment