Immigrant Intergenerational Mobility: A Focus on Childhood Environment*

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Abstract

Over 60% of immigrant parents in Sweden start off in the bottom quintile of the income distribution, yet only about 30% of their children are still in the bottom income quintile in adulthood. This progress notwithstanding, we show using administrative data that immigrant children who grow up in the 20th income percentile place three income ranks lower than native children of similarly low-income parents. This income gap cannot be explained by differences in parent education levels, family structure, or municipality of residence. The gap can, however, be explained by differences in immediate, 100 × 100 - meter neighborhoods. Immigrant children grow up in relatively denser neighborhoods with fewer native-born and high-earning neighbors. Data from Stockholm suggest that immigrant families sort into different neighborhoods than natives due to Sweden's rental housing allocation mechanism that is based on waiting time rather than market rents.

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1 Introduction

Immigration is an intergenerational process, often driven by parents' desire to ensure a better life for their children. How well do immigrant children do relative to their parents? Do they differ from native children in this respect? In this paper, we study the intergenerational income mobility of the children of immigrants and natives using rich administrative data from Sweden – a country that has welcomed a large number of immigrants from all over the world since the Second World War.

Over 60% of the immigrant families in our data start off low-income, in the bottom 20% of the income distribution. By the time children in these families reach their 30s, however, only about 30% of them are low-income. While immigrant children make remarkable progress relative to their parents, native-born children are nonetheless more upwardly mobile than immigrant children. Specifically, the average immigrant child who grows up in the 20th income percentile in Sweden places about three income ranks lower in adulthood than a native-born child with similarly low-income parents. The three-rank difference in annual income is equivalent to about 20 days of median earnings in Sweden, where median earnings are calculated over the period when individuals in our sample are 30 years old.

What explains this intergenerational income gap? Although immigrant families are on average less educated and more likely to be headed by a single mother, we find that differences in parental education or family structures do not explain the gap. What does explain it are childhood neighborhoods. The Swedish setting offers the unique opportunity to analyze the role of neighborhoods at different levels of aggregation, down to 100×100 - meter grids. We find that the gap between immigrant and native children born into families in the bottom quintile and who grow up in the same municipality is virtually the same as the unconditional gap. However, when comparing low-income immigrant and native children who grow up in the same small-scale neighborhood (given by 100×100 - meter coordinates) immigrant children reach the same or an even higher income rank in adulthood. This finding adds to recent, but still limited evidence, on how childhood neighborhoods are related to the intergenerational income gap between immigrants and natives (Abramitzky et al., 2021) and black and white men (Chetty et al., 2020).

Building on the observation that the gaps we observe are given by between-location differences, we next zoom in on the characteristics of the childhood neighborhoods natives and immigrants grow up in. We show that natives are more likely to grow up surrounded by other natives and that their neighborhoods are more likely to be dominated by single-family detached homes, regardless of the income of their families. Immigrants, on the other hand, live in neighborhoods where multi-unit dwellings predominate and where there are relatively few natives.

In the final part of the paper, we posit that the sorting of natives and immigrants across different locations is partly influenced by the mechanics of the Swedish rental housing market. In Sweden, apartments are not allocated through market rents, but through a housing queue. Longer time in the queue translates into a higher probability of being invited for a viewing and eventually signing a long-term lease. This system has the unintended consequence of notoriously-long waiting lists for apartment rentals. For instance, average wait times in 2016 were nine years in Stockholm as a whole and up to 16 years in the most desirable neighborhoods (Terner Center, 2017). Using rich geo-coded data from the Stockholm county housing queue, we show that immigrant families sort into areas with lower wait times in the queue than native families, and that this holds across the income distribution as well as when we control for detailed apartment characteristics. We interpret these results as suggestive evidence that the queuing system disproportionately disadvantages immigrant families.

Our paper contributes to the small, but growing literature documenting the intergenerational mobility of immigrants and natives (Aydemir et al., 2009, Abramitzky et al., 2021, Hammarstedt and Palme, 2012, Hermansen, 2016). We add to this literature by studying immigrants and natives in a country known for its low levels of inequality and relatively high levels of income mobility (Björklund and Jäntti, 1997). Our findings also speak to studies that have found that where a child grows up can have large consequences for his or her outcomes later in life (e.g., Åslund et al., 2011, Gibbons et al., 2013, Chetty et al., 2014, Chetty et al., 2016, Chetty and Hendren, 2018, List et al., 2020). Finally, our paper corroborates work that links residential segregation to housing search frictions (Bergman et al., 2019).

In the section that follows we provide background on immigration to Sweden. In Section 3, we explain how we selected our sample for analysis and provide information on the data we use. Section 4 shows the intergenerational mobility differences between immigrant and native children, while Section 5 offers evidence that childhood neighborhoods can explain these differences. In Section 6, we show that the allocation mechanism of rental housing may contribute to differential sorting across neighborhoods between the two groups. Section 7 concludes.

2 Immigrants in Sweden

Sweden has for decades been a destination for large numbers of immigrants with widely different backgrounds. Since World War II, when Sweden became a net immigrant-receiving country, numerous immigration waves have occurred. The 1950s and 1960s were dominated by labor immigration, primarily from other Nordic countries like Finland, but also from Mediterranean countries like Greece, Italy, and Yugoslavia (Hammarstedt and Palme, 2012).

Labor immigration from non-Nordic countries came to a halt in the early 1970s, but immigration continued in the form of family reunification and refugee immigration.[1] Refugees from Chile arrived predominantly in the 1970s; from Iran, Iraq, and Lebanon in the 1980s; from Somalia, Eritrea, and Former Yugoslavia in the 1990s. The timing of refugee arrivals has mirrored the timing of conflicts around the world. Given the volume of these refugee waves, 1970 marked a shift in Sweden towards mostly non-European immigration.

As of 2016, about 17% of the Swedish population was foreign-born, compared to less than 7% in 1970. By comparison, the share of foreign-born in the United States has had a similar trajectory, rising to over 13% in 2013 from a low below 5% in 1970 (OECD, 2017).

3 Data and sample selection

We use Swedish register data from the GeoSweden database, which covers all individuals with a permanent residence permit valid for at least one year for the 1990-2014 period.[2] The data contain variables from several registers, including the education, income, and employment registers.

In order to construct our sample, we link children born between 1974 and 1984, who are still registered in Sweden at age 30, to their parents.[3] We focus on two groups: the native children in our analysis are children born in Sweden to Swedish-born parents. The immigrant children are born abroad or in Sweden to foreign-born parents. This implies that we exclude children born abroad to Swedish parents and children born to one Swedish parent and one foreign parent, regardless of the place of birth. We choose this restriction to simplify the interpretation of our comparisons throughout the paper. For immigrant children born abroad, we impose the restriction that they arrive before the age of 16.

Table 1 shows the number of observations in each group. We have information on both parents for 97% of native children in our data.[4] In comparison, 82% of the immigrant children in our sample have both parents in the register. The majority of those who have only one parent in the register are in Sweden with their mothers.[5] A parent could be

[1]Nordic labor immigration continued, primarily from Finland, as the 1954 Nordic Agreement allowed free movement for citizens of the Nordic countries.

[2]GeoSweden is administered by the Institute for Housing and Urban Research at Uppsala University. The data are collected and anonymized by Statistics Sweden.

[3]Parent identifiers for each individual are available, provided the parents have also registered in Sweden (either as a resident or as a citizen) at some point between 1990 and 2014.

[4]We restrict our attention to whether parents are present in the register during the period in which we are interested in measuring parental outcomes - when the child is between 15 and 19 years old. This means that we include children who either had only one parent or both parents in the register *throughout the entire 5-year period*. A further implication is that we are not capturing those children whose parents migrate in and out of Sweden during that time.

[5]For individuals who are in Sweden with one parent only, we define immigrant status based on the

Table 1: Summary Statistics

	Mean	Std. dev.	No. of obs.
Panel A: Natives			
Age mother when child 15-19	44.57	4.88	814,610
Age father when child 15-19	47.17	5.35	800,860
Both parents in the register	97.15	n/a	819,422
Only mother in the register	2.27	n/a	819,422
Number of unique mothers			544,578
Number of unique fathers			534,948
Panel B: Immigrants			
Age mother when child 15-19	43.03	5.49	100,533
Age father when child 15-19	47.15	6.42	87,725
Both parents in the register	82.31	n/a	103,265
Only mother in the register	15.05	n/a	103,265
At least one parent refugee	34.49	n/a	103,265
Average age at arrival	8.87	4.05	54,849
Number of unique mothers			67,091
Number of unique fathers			57,063

Notes: This table reports summary statistics for natives and immigrants, respectively. Children are born between 1974 and 1984. We classify a child as a refugee if at least one of his or her parents is classified as a refugee in our data. Where standard deviations are not reported, the Mean column shows shares.

missing from the register if he or she is deceased, has only a temporary residence permit - which allows for less than one year of residence in Sweden - or lives abroad permanently. On average, immigrants who are born abroad are aged 9 when they arrive in Sweden. Almost 35% of the immigrants in the sample have a parent who is a refugee.

4 Intergenerational mobility

We use the linked dataset of parents and children to study the intergenerational mobility of immigrants and natives in Sweden.

We first calculate *family income* as the average combined income from employment and self-employment of the parents in the register during the years when the child is 15 to 19 years old.[6] Measuring family income in this time frame allows us to work with a large sample of parents, including those who arrive in Sweden with teenage children. It also allows us to measure family income at a time when the children are likely still dependents and when most immigrant parents have spent a considerable amount of time

country of birth of that one parent.

[6]When the child has only one parent in the register, we measure family income as the average income of the existing parent during the years when the child is 15 to 19 years old. For the 1974 cohort, we measure family income when the child is between 16 and 20 because our income data start in 1990.

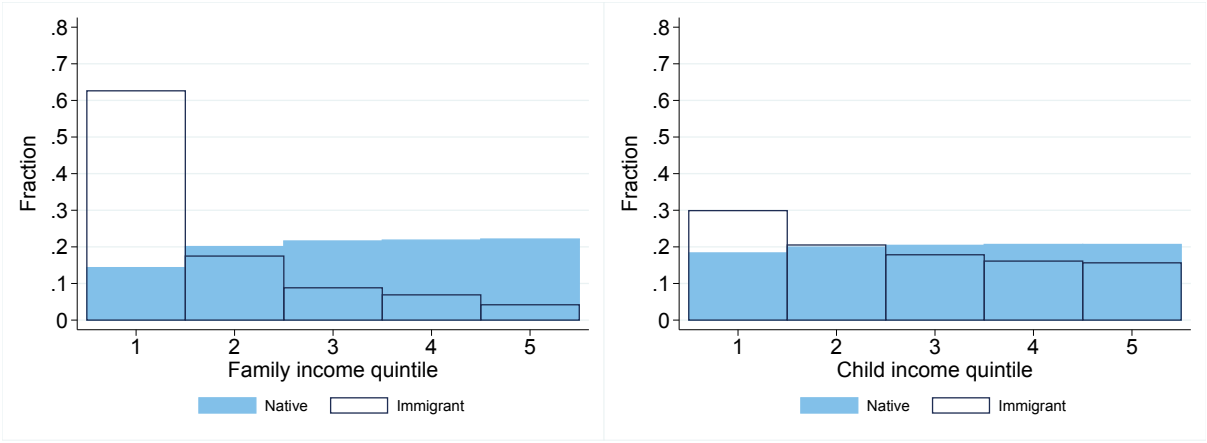
in Sweden. We include families with zero income.

We follow Chetty et al. (2014) and define the family's *percentile rank* based on its position in the national distribution of incomes relative to all parents with children in the same birth cohort, regardless of immigrant status. As Table 1 shows, parents of both immigrants and natives are in their early to late 40s, an age by which income ranks tend to stabilize (Chetty et al. 2014), so we can be confident that the income we capture is as close to lifetime income as possible.

We measure *child income* as the individual income the child earns when he or she is 30 years old. Just as for the parents, we define the child's percentile rank based on his or her position in the national distribution of incomes relative to all children in the same birth cohort.[7]

Figure 1a reveals that more than 60% of immigrant parents are ranked in the bottom quintile of the national income distribution, compared to about 15% of native parents. Figure 1b, however, illustrates the economic mobility of the children: only about 30% of immigrant children earn incomes that place them in the bottom of the income distribution at age 30. In contrast, about 20% of native children are in the bottom of the income distribution at age 30.

Figure 1: Income Distributions, Families and their Children



(a) Parent generation (b) Child generation

Notes: Figure 1a and 1b present histograms of the fraction of natives and immigrants in our sample that fall in each family income quintile in Sweden. Figure 1a shows the distribution for parents when their children are between the ages of 15 and 19. Figure 1b shows the distribution for the children of these parents, when the children are at age 30.

To better understand mobility patterns, we then estimate, for each group g, equations of the following type:

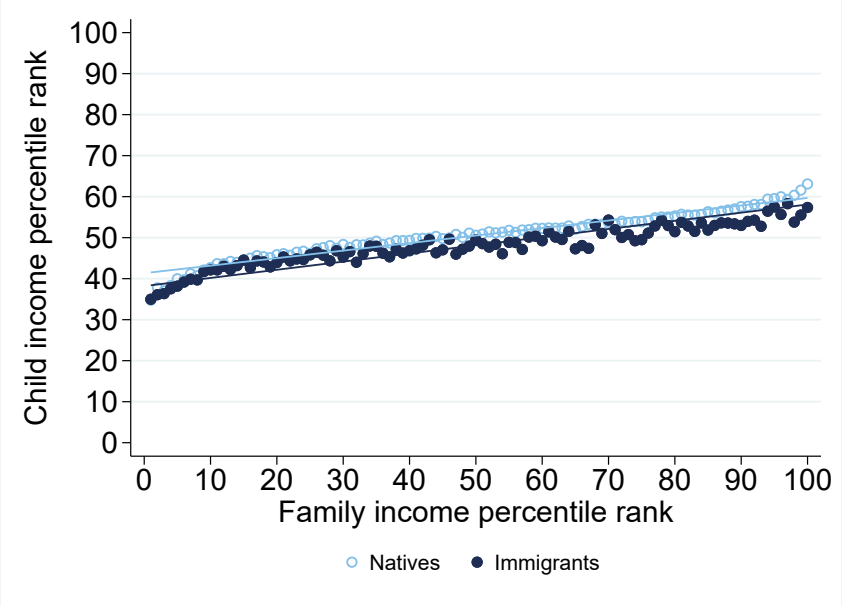
$$y_{icg} = \alpha_g + \beta_g y_{ipg} + \varepsilon_{icg} \tag{1}$$

[7]Both income variables are measured in 2014 SEK, adjusting for inflation using Statistics Sweden's Consumer Price Index.

where α_g gives the absolute rank mobility for children in group g with parents in the bottom of the income distribution. The β_g coefficient gives the association between family rank and child rank for children in group g and is a measure of relative mobility.

Figure 2 shows the average child income percentile ranks for children growing up in each family income percentile in Sweden, separately by group. Each dot represents an equally-sized bin. Figure 2 reveals three things. First, the higher concentration of dark blue dots on the left-hand side of the figure confirms what we saw in Figure 1a: immigrant families are concentrated more heavily in the bottom of Sweden's family income distribution. Second, absolute mobility is higher for natives than for immigrants: the intercept is 41.34 for natives and 38.19 for immigrants. Therefore, a native born in the poorest family places roughly three income ranks higher than an immigrant born in the poorest family. Third, relative mobility is lower for immigrants than for natives. The native slope is 0.18, whereas the immigrant slope is 0.20, which indicates a slightly stronger association between incomes across generations for immigrants than for natives.

Figure 2: Intergenerational Mobility, Natives and Immigrants



Notes: The chart shows average child income percentile ranks for children growing up in each family income percentile rank in Sweden. Outcomes for children born in Sweden to Swedish-born parents (Natives) are reported separately from outcomes for children of immigrants. Here immigrant children are those who are born inside or outside of Sweden to foreign-born parents. Child income is measured at age 30, family income is measured as an average over the time period when the child is 15 to 19 years old. We rank children relative to all other children in their birth cohort. We rank parents relative to all other parents of children in the same birth cohort.

Table A.1 shows that this result holds also when using an alternative measure for parental income that takes into account the fact that immigrant parents' labor-related income may not reflect their earnings potential, especially in the first years since migration. In particular, instead of looking at parents' income when the child is between 15

and 19 years old, we measure it 10-14 years after the parents arrive in Sweden.[8] We choose this time window as various reports have documented that it takes about ten years for a significant share of the immigrant population to enter the labor market (see e.g., Bevelander 2011, who shows that refugees, resettled refugees, and family reunification immigrants who arrive after 1987 have employment rates between 60 and 70% 11-15 years after arrival). We see that whether we measure parental income when the child is between the ages of 15 and 19 (first row in Table A.1) or 10 to 14 years after the parents' arrival in Sweden (second row in the table) does not materially change our results. For the remainder of the paper, we therefore use the baseline parental income measure.

We can summarize the results in this section by putting the two measures of mobility together to obtain a measure of upward mobility (Chetty et al. 2020, Abramitzky et al. 2021). Since the majority of immigrant families are ranked in the bottom of the income distribution, we focus on children born in families at the 20th percentile. Using the slopes and intercepts obtained from equation 1 (and presented in Table A.1), we predict the income ranks of native and immigrant children born in families at the 20th percentile.

The predicted gap in income ranks is -2.8; that is, an immigrant born in the bottom quintile of the income distribution places 2.8 income ranks lower at age 30 than a native whose family is also placed in the bottom quintile. In SEK amounts, the gap we find is equivalent to about SEK 14,000[9], or about 5% of the median annual earnings in Sweden, where median annual earnings are calculated among individuals of prime working age (25-54) over the period when individuals in our sample are 30 years old. Although immigrant children in Sweden make great strides compared to their parents, when compared to natives, a non-trivial intergenerational income gap remains. In the next section, we look at factors that can explain this gap.

5 What explains the intergenerational mobility gap between natives and immigrants?

In this section, we consider two sets of factors that might explain the difference in intergenerational mobility that we observe between native and immigrant children: i) *family-level*

[8]We can calculate parental income during this time window for 73.7% of children in the immigrant sample. Since our income data start in 1990, we cannot compute income for parents of children in the earlier cohorts who arrive long before the birth of their children. Furthermore, ideally, we would observe income over the entire five-year period, for both parents (ten observations). In reality, we have on average 7.3 observations per family, again due to when our income data start. In addition, there may be return migration during this time window. It is often also the case that parents do not arrive during the same year, in which case the number of available observations might differ between parents. Therefore, we calculate average income over the period for each parent separately, to correctly account for the number of yearly income observations, and then sum over the two averages.

[9]We obtain this number by taking the difference between average incomes at rank 45 and rank 42, which are the approximate ranks where natives and immigrants born in the 20th percentile respectively place.

characteristics, namely family education and family structure and ii) *childhood environment*. We estimate, using the full sample, regressions of the following type:

$$y_{ic} = \alpha + \beta_p y_{ip} + \beta_{im} immigrant_{ic} + \beta_{imp} immigrant_{ic} \times y_{ip} + \gamma X_{ip} + \varepsilon_{ic} \qquad (2)$$

where y_{ic} is the child's income rank at age 30, y_{ip} is the family income rank, $immigrant_i$ is a dummy that indicates immigrant status and X_{ip} is a vector of controls. We are interested in the intergenerational gap in income at a given parental income rank $\bar{p}$ and how it changes with X_{ip}. The gap is given by $\beta_{im} + \beta_{imp}\bar{p}$.

Family-level characteristics

We define *parental education* as the maximum level of education observed throughout the time the parent is in the register, to reduce the number of missing values for immigrant parents in their first years in Sweden. We categorize families based on whether neither or at least one parent has a college degree or above.[10] In our data, this corresponds to having at least a post-secondary education that takes fewer than 3 years to complete. By this measure, 42.92% of children of natives and 28.71% of children of immigrants grow up in families where at least one parent has college or above.

We capture *family structure* by the number of siblings and by a dummy for whether both parents are in the register. It could be important to control for family structure, since, as described in Table 1, almost a fifth of immigrant children are in Sweden with just their mother.

We plot the predicted gap for children born in families at the 20th percentile in Figure 3. The first group of bars shows the immigrant-native gap, conditional on family income rank. The second group of bars shows the gap once we take into account family education and family structure. The average differences in family education and family structure notwithstanding, the intergenerational gap changes only marginally with the addition of these two variables. Hence, family-level characteristics beyond family income rank explain little of natives' mobility advantage.

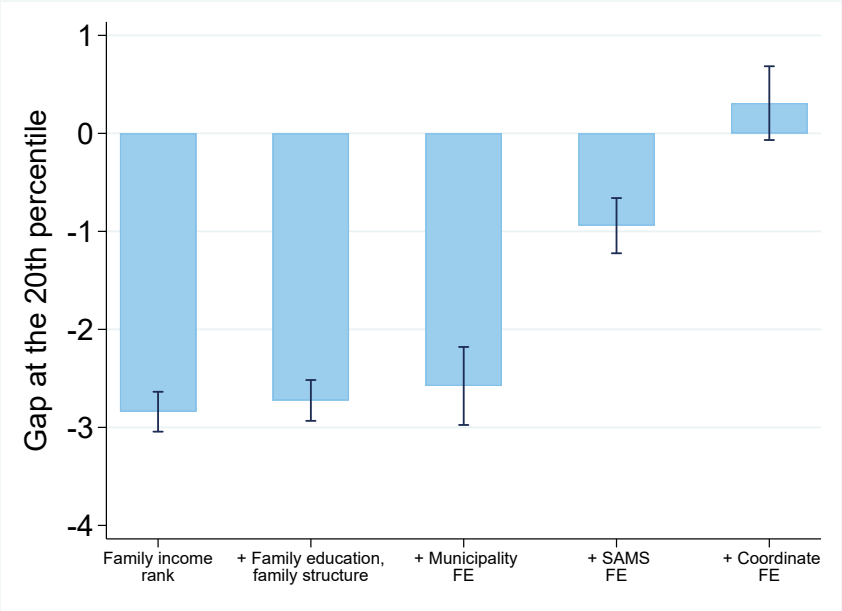
Childhood environment

Immigrants and natives may grow up in different neighborhoods. To the extent that these neighborhoods differ in the opportunities they offer, they may contribute to the mobility patterns we observe. We use three measures to capture childhood environment: i) *childhood municipality*; ii) *childhood SAMS (Small Area Market Statistics) area*, where

[10] We also create a dummy that takes the value 1 when family education is uncertain due to missing information for one or both parents.

SAMS areas are geographic areas defined by Statistics Sweden; and iii) *childhood neighborhood*, given by 100 × 100 - meter coordinates. Across all three measures, childhood location is defined as the location where the child spent the most amount of time between the ages of 6 and 16.[11]

Figure 3: Predicted Income Gap in Adulthood for Children Born at the 20th Percentile



Notes: The gap at the 20th percentile is measured as the percentage point difference between immigrant and native child income ranks in adulthood. Each estimate is produced using the specification in Equation 2. The first column includes no controls aside from family income rank. The second column includes controls for family education and family structure, where family structure is given by the number of siblings a child has and by whether both parents are in the register. The third column also includes a fixed effect for the Swedish municipality in which the child resides between the ages of 6 and 16. The fourth column replaces the municipality fixed effect with a fixed effect for the SAMS area of residence for the child when he or she is between the ages of 6 and 16. The fifth column uses the 100 × 100 - meter area of residence for the child when he or she is between the ages of 6 and 16 as the geographic fixed effect. Standard error bars on the gap estimates are reported in each column.

Municipalities are the most aggregated of the three measures. There are 290 municipalities in Sweden. They vary in area and population size, with the municipalities in the north being the largest but the least densely populated. There are approximately 9,200 SAMS in Sweden, which means that on average 1000 individuals live in a SAMS. SAMS areas have often been used in the literature to capture neighborhoods (see e.g., Åslund et al. 2015, Åslund et al. 2011). Finally, the 100 × 100 - meter coordinates are the most disaggregated measure: on average, the coordinates in our sample host about 18 people

[11]To be more precise, the location is given by the location where the mother lived when the child was between 6 and 16 when the mother is in the register (or by the father's location when only the father is in the register). Individuals do not enter the register themselves until they are 16 years of age. Given that our data starts in 1990 and the cohorts in our sample are born between 1974 and 1984, we cannot use the same number of observations to compute the modal location during the 6-16 age range for all cohorts.

during the period when the individuals in our sample are between 6 and 16.

It is a priori unclear at which level childhood environment would matter for intergenerational mobility and at which level it would matter differently for immigrants and natives. For example, previous Swedish evidence finds large variation in absolute mobility at the 25th percentile across local labor markets among individuals born in Sweden between 1968 and 1976.[12] For the US, Abramitzky et al. (2021) find that the immigrant-native intergenerational (positive) gaps close when they compare immigrants and natives who grow up in the same county, whereas the intergenerational income gaps between black and white boys remain even when controlling for Census blocks, which host on average 50 people (Chetty et al., 2020).

The third bar in Figure 3 shows that adding municipality fixed effects, and thus comparing immigrants and natives who grow up in the same municipality, does not substantially lower the gap. SAMS area fixed effects, instead, lower the gap by a third. Finally, controlling for the immediate neighborhood in which a child grows up not only erases the gap between immigrant and native children, but also reveals that immigrants fare as well or even better, on average, than natives who grow up in the same environment.[13]

6 Neighborhood characteristics and sorting

On average, children of immigrants are less upwardly mobile than the children of natives. However, the differences in upward mobility disappear when we compare children of immigrants and natives who grow up in the same neighborhoods, as defined by 100 $\times$ 100 - meter coordinates. In other words, the gaps we find are due to between-location differences and not due to within-location differences. We therefore investigate two follow-up questions: i) how these locations differ from each other and ii) the role that institutions have in determining differential sorting across locations.

6.1 Differences across locations

We first look at how the childhood neighborhoods of immigrant children differ from the areas where native children grow up.

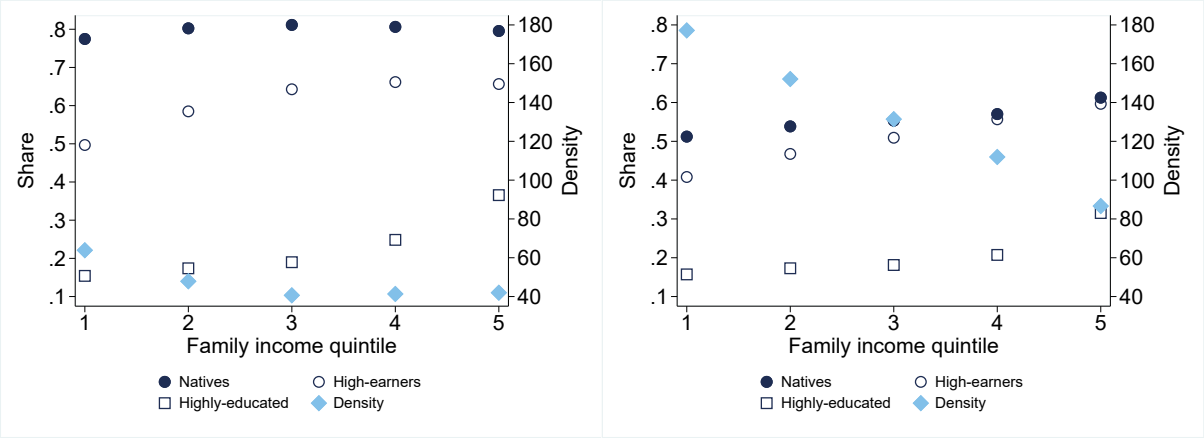
We characterize childhood neighborhoods - given, as before, by the modal coordinate during the period between 6 and 16 years of age - along the following dimensions: share of native residents, share of high-earning residents (defined as individuals earning above the municipality median income), share of highly-educated residents (defined as those with a

[12]Local labor markets group together several municipalities based on commuting patterns.

[13]Table A.2 shows between- and within-neighborhood standard deviations of the outcome variable (child income rank) for the three neighborhood measures: municipality, SAMS area, and 100 x 100 - meter coordinate. The overall standard deviation of the outcome is 29.4. The table shows that even when we control for areas at a granular level, there is enough variation in the outcome variable to make our analysis meaningful.

college or above degree), and population density.[14] Population density in our context is meant to capture the type of dwellings that dominate the neighborhood, i.e. single-family detached homes or multi-unit dwellings. A higher density in the immediate neighborhood means a child grows up in an area where multi-unit dwellings are the norm. Lower density, by contrast, is what characterizes areas with single-family detached homes. We consider the average characteristics of the childhood neighborhood over the entire period from 6 to 16 years of age.

Figure 4: Neighborhood Characteristics, by Immigrant Status and Family Income



(a) Natives (b) Immigrants

Notes: Panel (a) shows average characteristics of neighborhoods in Sweden where native families reside and Panel (b) shows the same for the neighborhoods where immigrant families reside. Characteristics are shown for natives and immigrants in each family income quintile. Characteristics include share of neighborhood who are native Swedes (Natives); share of neighborhood with individuals earning above municipality median income (High-earners); share of neighborhood who have a college degree or above (Highly-educated); and the number of people living in the neighborhood (Density, on the right-axis). A neighborhood is defined as an 100 × 100 - meter area.

Figure 4a shows neighborhood characteristics for natives and Figure 4b for immigrants. We note a few things that stand out. First, we see that native children grow up in neighborhoods with a substantially higher share of natives than immigrants, and this is true across the income distribution. Moreover, immigrant families that earn more do not live near many more natives than families that earn less. These patterns suggest that factors beyond financial considerations determine the share of natives among immigrants' neighbors.

Second, natives grow up in neighborhoods with much lower density than immigrants; this is also a pattern that holds across the income distribution. Immigrants in the bottom income quintile live in areas that are almost four times as dense as those of natives in the bottom income quintile. Even neighborhoods of the richest immigrant families are more than twice as dense as the ones the richest natives live in. In general, however, families

[14]We only consider those above the age of 18 when we make these computations.

ranked higher in the income distribution are able to live in less dense neighborhoods compared to families ranked lower.

Finally, the share of highly-educated residents in native and immigrant neighborhoods is very similar, a finding that is perhaps surprising given differences in the native share, the density, and the share of high-earners across these neighborhoods. Education level is thus unlikely to be driving sorting into different neighborhoods between natives and immigrants.

6.2 The Swedish housing system

Figure 4 illustrates the fact that immigrants and natives grow up in neighborhoods with substantially different shares of natives and levels of density. It also suggests that family income can only go so far in smoothing out the differences in neighborhood characteristics between the two groups. One aspect that natives and immigrants differ in, naturally, is the amount of time they have spent in Sweden. This puts immigrants at a disadvantage when it comes to the rental housing market, as we describe later in this section. Moreover, immigrants are also more likely to be credit-constrained, which makes owning relatively more difficult. In our sample, even low-income natives are more likely to be homeowners rather than renters: 23% of them live in rental housing, compared to 59.7% of low-income immigrants.[15] In the sections that follow, we provide evidence that the Swedish housing system presents immigrants with more barriers than natives and can explain why we generally see immigrants and natives living in different kinds of neighborhoods.

6.2.1 Overview

In Sweden, a person can rent, be a tenant-owner, or an owner-occupier.[16] The rental market is characterized by rent setting, whereby rents are negotiated between landlord and tenant associations (Sodini et al., 2016). In order to have access to a first-hand contract, whereby the tenant has tenure security and rent is regulated, one typically has to join a housing queue (Wilhelmsson, 2021). The longer one spends in the queue, the higher the probability of finding an apartment to rent in the area of one's choice. More desirable housing generally requires more time in the queue than less desirable housing. Housing companies can be public - owned by municipalities - or private. Public housing in Sweden differs from social housing in countries like the U.S. in that access to it is not means tested. Public housing is, however, generally less desirable and vulnerable families (such as low-earners, single-parent families, and immigrants) are overrepresented

[15]These numbers are calculated based on the modal housing tenure type during the 6-16 age range. Note that we do not observe all cohorts at all ages of the 6-16 age range in the housing tenure type data.

[16]We infer the tenure type using information on the type of housing (e.g., detached house, multi-dwelling building, etc.) and the legal form of ownership. See Blind (2015, p. 138) for details on how this is achieved.

in this tenure type, especially in the largest cities (see, e.g. Magnusson and Turner, 2008). Public rental housing makes up about 19% of the Swedish housing stock, with private rental housing making up about 18% (Terner Center, 2017).

If a person is a tenant-owner, they live in an apartment that they have purchased the right to use. In practical terms, that means that the owner purchases a share in the association of tenant-owners who own the building together (also called a cooperative). About 23% of the Swedish housing stock is cooperative housing (Terner Center, 2017). An owner-occupier owns their house and has the right to use it. Owner-occupied dwellings are usually restricted to detached houses and very rarely refer to apartments in multi-dwelling buildings. Owner-occupied houses make up about 41% of the Swedish housing stock (Terner Center, 2017).

Finally, there is a so-called second-hand rental market, whereby owners sublet their dwellings for a limited amount of time. In the case of tenant-owners, the amount of time allowed to rent out the apartment depends on the tenant-owner association.[17] Apartments on the second-hand market are often the only viable option for immigrants when they first arrive, since upon arrival immigrants have no points in any queue, whether public or private. An exception is refugees, who are offered housing by the municipalities upon arrival. Unlike the first-hand rental market, the second-hand rental market is unregulated and rents tend to be higher than in the first-hand market, even conditional on unit characteristics.

6.2.2 The Stockholm Housing Queue

We have access to data from the Stockholm Housing Agency (SHA), which manages the queue in Stockholm County. The data contain information from 2000 to 2017 on the universe of apartments that have been rented through the queue system.[18] Approximately 15% (32%) of the natives (immigrants) in our sample grow up in Stockholm county, so this analysis concerns a significant share of the original sample.

The apartments that are in the queue can be either apartments owned by municipal housing agencies, or apartments owned by private landlords. The SHA handles all municipal-owned apartments, as well as a proportion of the private-owned apartments.[19] A substantial number of available (first-hand) rentals in the Stockholm area is therefore captured by our dataset. Municipal housing companies own half the rental stock at the

[17]Note that in our data the tenure variable characterizes the dwelling where the individual currently lives and not the individual's status. In the case of second-hand rental contracts, an individual that is in fact a renter shows up as an owner in our data. To the extent that immigrants are more likely to rent on the second-hand market, we may be overestimating the share of owners among immigrants.

[18]We are grateful to Alvin Lindstam for scraping these data and making them available online.

[19]Private landlords may choose to be a part of a landlord association, which then makes recommendations to their members on how many apartments should be brokered by the SHA. Companies that do not rent out all of their apartments via the SHA often have their own queue-based tenant selection system.

national level (SABO, 2013).

For each apartment rented via the queuing system in Stockholm, we have the following information: address, geographic location given by coordinates, number of rooms, area, floor, monthly rent, landlord, whether the apartment is new or special (e.g., student housing, housing for the elderly, etc.), the queue start date for the household that moved in, the move-in date, and the start and end dates of the ad.

We use these data to characterize childhood neighborhoods in terms of the average time spent in the queue. The Stockholm data are at the apartment level, whereas the register data are at the 100 × 100 - meter level. We therefore first match the apartments in the housing queue data to the childhood neighborhoods in the register data. For details on how we accomplish this, see Appendix A.1. As detailed in Appendix A.1, we can match 9% of all Stockholm county childhood neighborhoods to the housing queue data, most likely due to the fact that many individuals grow up in neighborhoods without any rental housing whatsoever. In terms of the number of individuals, this translates into 19% of the natives in our sample who grow up in Stockholm county and 50% of immigrants who grow up in Stockholm county.[20] The fact that we can match predominantly rental housing neighborhoods to a higher share of immigrants than natives is consistent with the national-level pattern depicted in Figure 4, which showed that natives grow up in lower-density neighborhoods than immigrants.

We first calculate wait time at the housing unit level by taking the difference (in days) between the end date of the ad and the start date of the queue for the person who eventually rents out the unit. We construct average wait times at the childhood neighborhood level by taking the mean of wait times over all apartments matched to a neighborhood.

We also construct a neighborhood-level measure of wait time that takes into account unit characteristics and time effects by estimating the following equation in the housing queue data:

$$ln(wait\_time)_{uct} = \lambda_u + \lambda_c + \lambda_t + \varepsilon_{uct} \tag{3}$$

where λ_u are unit-characteristic fixed effects (number of rooms-by-area-by-floor-by-new construction), λ_c are coordinate (neighborhood) fixed effects, and λ_t are time dummies. The λ_c's give average wait times at the neighborhood level, once unit characteristics and time effects are taken into account.[21]

[20] 120,561 natives grow up in Stockholm county; 22,441 have information from the housing queue data. The corresponding numbers for immigrants are 32,649 and 16,473.

[21] Note that estimating this equation requires multiple housing units per coordinate, so we can estimate λ_c for a smaller number of neighborhoods (2,343 out of the 2,790 that we originally matched).

6.2.3 Immigrants sort into areas with lower wait time

The length of the housing queue in a neighborhood proxies the extent to which immigrants are at a disadvantage in terms of access to that neighborhood. The longer the queue, the harder it is to move into that particular neighborhood.

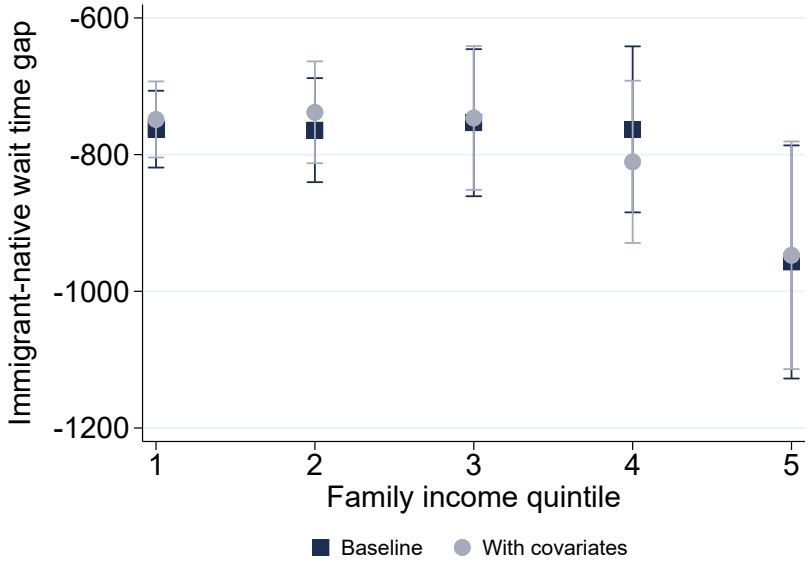
We want to understand how immigrants and natives sort differently across locations with different wait times by estimating the following equation:

$$wait\_time_i = \alpha + \beta immigrant_i + \theta_k family\_income_i + \gamma_k immigrant_i \times family\_income_i + \varepsilon_i \quad (4)$$

where $wait\_time$ gives the wait time in individual i's childhood neighborhood, measured either in days or as given by equation 3 to capture unit characteristics; $immigrant_i$ is a dummy that indicates immigrant status and $family\_income_i$ indicates the family income quintile of individual i (with the bottom quintile the reference category). We are interested in the immigrant-native gap in wait time, given by $\beta + \gamma_k$. We weight the regression to have the same distribution of immigrants and natives across the family income distribution as in the Stockholm county sample. In an alternative specification, we add the family-level covariates discussed in Section 5 to this equation.

We present results from these two regressions in Figure 5. Focusing first on the dark blue squares, two things stand out from this figure: i) the coefficients are strongly negative and ii) there is little variation across family income quintiles. Together, they suggest that immigrant families live in areas with lower housing queue wait times and that income does not help getting them into neighborhoods with higher queue wait times. This pattern holds both when we add family-level covariates (gray circles) and when we use the alternative wait time variable (Figure A.1 in Appendix).

Figure 5: Housing Queue Wait Time Gap in Days, Immigrants-Natives



Notes: Chart shows average differences in housing queue wait times between immigrants and natives in Stockholm. Wait time measures the number of days a person was on the housing waiting list before accepting an opportunity to rent an apartment. Averages are shown for families in each family income quintile. Covariate specification controls for parental education and family structure, as discussed in Section 5. Wait time data come from Stockholm Housing Agency (HSA) and cover 2000-2017.

Given that, conditional on income, an important remaining difference between natives and immigrants in the rental housing context is the amount of time they have spent in Sweden, we interpret these results as evidence that the rental housing allocation system disproportionately disadvantages immigrants. A related additional difference between natives and immigrants could be that, even conditional on income, natives are more secure in the housing they have and can afford to spend more time waiting in a queue for new housing. Immigrants thus likely sort into certain locations due in part to the institutional peculiarities of the Swedish housing system. As Section 6.1 documents, there are non-trivial differences, from density to shares of native residents, in the kinds of neighborhoods where immigrants and natives live.

7 Conclusion

We study the intergenerational mobility of native and immigrant children using Swedish administrative data. From the perspective of the destination country, the successful integration of the new arrivals rests not just on parental outcomes, but also on their children's.

Our main analysis shows that immigrant children who grow up in the 20th income percentile place three income ranks lower than native children of similarly low-income parents. We cannot explain this income gap with differences in native and immigrant

families as measured by parent education levels, family structure, or municipality of residence. The gap can, however, be explained by differential sorting across 100×100 - meter neighborhoods. We present evidence that immigrant children grow up in neighborhoods dominated by high-density, multi-unit dwellings with fewer native-born and high-earning neighbors. Natives are more likely to grow up in neighborhoods with single-family homes and high shares of natives.

In the last part of the paper, we provide suggestive evidence that the way the housing market allocates rental housing - via a queuing system, as opposed to market rents - contributes to immigrants' sorting into different areas than natives, even conditional on income. We conclude that policies that limit mobility and neighborhood access are likely creating impediments to intergenerational mobility for immigrants.

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A Appendix

A.1 Linking Stockholm Housing Queue Data to Register Data

We start with 121,516 apartment-level observations. We drop 1,255 observations which correspond to ads for apartments located in Knivsta and Uppsala municipalities, which are not part of Stockholm County. We drop the 30,564 observations that correspond to apartments for special groups (e.g., students or the elderly), 133 observations that have missing information for the end date of the ad, and 7 observations for which the wait time is negative (likely due to data entry error). The data were scraped in May of 2018 and at that time data before 2000 and after 2017 were incomplete, so we limit our sample to observations between 2000 and 2017. 2,016 observations do not have coordinates, so we do the geo-coding ourselves using the addresses provided and R's ggmap package. Our final sample has 88,372 observations.

The coordinates in the Stockholm housing queue data are for a given building. The register data contain coordinates for centroids of 100 $\times$ 100 - meter boxes. We therefore first reconstruct the boxes starting from the centroids, then use an algorithm that checks which points from the Stockholm housing data intersect with these boxes. Note that intersection here means either being contained within the box, or touching the box (e.g., the residence lies on one edge of the box).

Using information on the queue start date and the end date of the ad, we can calculate wait times – the time spent in the queue for the person who ends up renting an apartment. We average over the wait times that characterize apartments to characterize the 100 $\times$ 100 - meter childhood neighborhoods. We start with 88,372 apartments, which are located in 17,831 unique coordinates. We are able to match 11,254 of these 17,831 coordinates to the 100 $\times$ 100 - meter neighborhoods in the register data. On average, 6.8 (s.d. 4.3) apartments are matched to each neighborhood.[22] This results in 2,790 childhood neighborhoods for which we can calculate average wait times. Note that there are 30,112 unique 100 $\times$ 100 - meter (Stockholm county) childhood neighborhoods in the register data. We are thus able to characterize 9% of the childhood neighborhoods in Stockholm county in terms of wait time. The fact that we have unmatched housing queue data means that not all boxes contain points from the housing queue data. This may happen if, for example, the 100 $\times$ 100 - meter neighborhood is in an area where single-family homes predominate, as these tend to be exclusively owner-occupied.

[22]Though a rare occurrence, a single apartment can be matched to multiple neighborhoods (11,150 apartments are found in one neighborhood, 103 points are found in two neighborhoods, and 1 point is found in three neighborhoods).

A.2 Tables

Table A.1: Intergenerational Mobility Estimates

	Natives		Immigrants	
	Intercept (1)	Slope (2)	Intercept (3)	Slope (4)
Child 15-19	41.34	0.18	38.19	0.20
	(0.07)	(0.00)	(0.13)	(0.00)
10-14 yrs. since arrival	41.58	0.18	38.14	0.20
	(0.07)	(0.00)	(0.15)	(0.01)

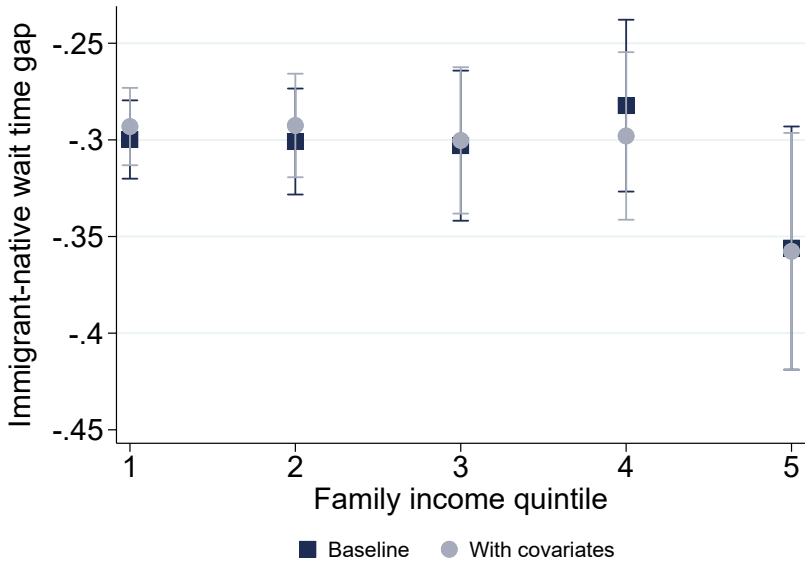
Notes: This table reports intercepts and slopes from estimating equation (1) separately by natives and immigrants. The first row reports the coefficients from the baseline specification, where family income ranks are calculated based on family income measured when the child is between 15 and 19 years old. The second row reports the coefficients from an alternative specification where family income ranks are calculated based on family income measured 10 - 14 years since the arrival of parents in Sweden.

Table A.2: Neighborhood between and within standard deviation

	Between SD	Within SD
Municipality	2.30	29.3
SAMS	8.15	28.97
Coordinate	22.48	23.87

A.3 Figures

Figure A.1: Housing Queue Wait Time Gap (Alternative Measure), Immigrants-Natives



Notes: Chart shows differences in housing queue wait times between immigrants and natives in Stockholm, conditional on housing characteristics, as estimated by equation 3. Wait time refers to number of days spent on the housing waiting list before accepting an opportunity to rent an apartment. Averages are shown for families in each family income quintile. Covariate specification controls for parental education and family structure, as discussed in Section 5, when measuring differences between immigrants and natives. Wait time data come from Stockholm Housing Agency (HSA) and cover 2000-2017.