

Neighbourhood Attainment of Children of Immigrants in Greater Oslo: Intergenerational Inertia and the Role of Education

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Abstract

One element in the integration of new groups of inhabitants is location in the neighbourhood hierarchy. We define neighbourhood hierarchy in Oslo according to the median income of working age males in the neighbourhood, and use a rich register-based data set to describe neighbourhood attainment (i.e. location in the hierarchy of neighbourhoods) subsequent to completion of education. We find that descendants of parents of Asian or African background systematically occupy lower status neighbourhoods than do descendants of natives. Higher education reduces differences in neighbourhood attainment between natives and descendants of African and Asian parents, but it does not eliminate the differences.

Part of the differences can be due to some kind of intergenerational inertia, we test for this in a multivariate regression frame. The interdependency between median income in the neighbourhood when aged 16 and neighbourhood attainment is stronger than between parental income at 16 and attainment. Moreover, controlling for income variables, the educational

premiums for natives vanishes; for descendants of Asian and Africans, they are reduced but remain significant. These results lead us to ask whether higher education for children of immigrants is a vehicle for social mobility, while it for children of natives is a means for maintaining privileges.

Keywords: social inequality, spatial sorting, neighbourhood hierarchy, Intergenerational inertia, Immigrant gap, Oslo

1. Introduction

Over the last decades, Greater Oslo has gone through a major demographic transition. In 1980, only 1.5 percent of the population was either an immigrant with an Asian or African background or a Norwegian-born child of Asian or African immigrants. In 1990, this share had grown to 4.3 percent and rose to 12.2 percent in 2011. Even more striking is the changing composition of the population with an Asian or African country background: in 1980, 14.9 percent of this group were born in Norway; this share was up to 20.2 and 31.1 percent in 1990 and 2011 respectively.

In the presence of such changes, there is an obvious concern for societal cohesion and integration. Experiences from other European countries provide an argument for special concern about integration of inhabitants with an Asian and African background. We have studied one particular aspect of integration: how children of Asian and African parents locate themselves in the neighbourhood hierarchy after completing their education, as compared to that of native Norwegians.

A decomposition reveals stronger educational premiums¹ of higher education for young adults with an Asian or African background than for natives, and a corresponding African/Asian disadvantage in neighbourhood attainment that is higher at lower educational levels than at higher levels. Part of the decomposition is estimating the effect of paternal income and neighbourhood median income experience in adolescence. We find a significant persistence across generations; however, this persistence is lower than what is found in the US (Sharkey, 2008).

¹ The educational premiums, in terms of neighbourhood attainment, are simply defined as the expected difference between neighbourhood attainments of individuals at different steps on the educational ladder.

The ambition of this paper is to contribute to the empirical knowledge of spatial assimilation across generations of immigrant groups, neighbourhood attainment (Alba & Logan, 1991; Gustafsson, Katz, & Österberg, 2017; Sharkey, 2008; White & Sassler, 2000), and transmission of inequality across generations (Chetty, Hendren, Kline, & Saez, 2014; Ham, Hedman, Manley, Coulter, & Östh, 2014; Heidrich, 2017; Sharkey, 2008). Our study has been carried out in the context of the rapidly changing demographics of Oslo, utilising high quality register data with complete coverage of the cohorts born between 1975 and 1987 who, at the age of 16, resided in Greater Oslo together with (at least one of) their parents. We followed these cohorts until 2011.

Social integration of immigrants and their children is a multi-faceted topic, which we do not address broadly. What we have studied is how young adults are allocated in the hierarchy of neighbourhoods subsequent to completing their education. By systematic comparisons of how descendants of Asian and African parents locate themselves in the hierarchy of neighbourhoods in comparison to descendants of natives, we aim to contribute to knowledge about spatial assimilation. The interdependencies between educational attainments, country background and placement in neighbourhood hierarchies are also studied.

Statistics Norway defines an individual's country background according to his/her parents' country of birth; it is a country-of-origin measure. It is important to note that country background is not the same as country of birth, ethnicity nor formal citizenship. Country background encompasses dimensions pertinent in analyses of assimilation over a longer period.² The classification of country background is based on parents' country background, and the country background of adopted children follows that of their adoptive parents.

² An individual with one Norwegian and one non-Norwegian parent is classified as having a Norwegian country background. Children with two different non-Norwegian country backgrounds are classified according to the country background of their mother.

We chose to contrast neighbourhood attainment for young adults with African and Asian country background with that of descendants of Norwegian parents. Of course, these are heterogeneous groups. Our approach resembles that of Gustafsson et al. (2017), who contrast the neighbourhood attainment of native Swedes and what they term ‘visible minorities’.

Within a regression frame, we study differences in the levels of socio-economic neighbourhood outcomes between descendants of natives and immigrant parents, and we study how educational returns in terms of neighbourhood status differ between natives and immigrants.

In the next section, we give a brief background, referring to several studies relevant to our paper. Section 3 gives more information on the specific Oslo context; Section 4 presents the data used and some descriptive statistics. The core of the paper is Section 5, which contains the empirical analyses. The paper is rounded off by some brief concluding remarks.

2. Background

Any urban region can be viewed as a mosaic of neighbourhoods that varies with respect to a multitude of dimensions. Neighbourhoods differ in characteristics and in attractiveness.

Individuals are not allocated into this mosaic in a random fashion. Using a simple and intuitively convincing way to translate ‘differences along a multitude of dimensions’ into a unidimensional hierarchy of neighbourhoods (Sampson, 2012), we investigate empirically how young people self-sort into this hierarchy over a period subsequent to nest-leaving.

Neighbourhoods are valued by actual and prospective residents in light of a multitude of dimensions, and differently from one person to another. Individuals allocate into neighbourhoods according to opportunities, constraints (financial, cognitive or other limitations on accessibility) and preferences. The existence of moving costs also creates inertia in residential location. (Hedman, 2013; Nordvik, 2001; Sharkey, 2012; Zhang, 2011).

The hierarchy of neighbourhoods is, in our study, captured by the central tendency of the local income distribution; it resembles what Sampson (2012) calls ‘neighbourhood attainment’. He argues that ‘*Although most studies of neighbourhood stratification examine the low end of the distribution in the form of the poverty rate, median income better captures the full distribution of income in the neighbourhood ... with a familiar metric – the dollar*’ (p. 292). Sampson uses a dollar value of the median deflated into a constant year 2000 money value.

Interpreting a higher neighbourhood income as a sign of a better neighbourhood can be justified in different ways. Those who have the strongest financial position are able to outbid others and end up occupying the most preferred neighbourhoods. A more direct channel is when private affluence spills over into a better supply of collective goods and ability to act on behalf of the neighbourhood (Hoff & Sen, 2005; Sethi & Somanathan, 2004).

As neighbourhoods vary according to a multitude of dimensions, it is not surprising that studies of location in the hierarchy of neighbourhoods define hierarchies differently. In an early study, attainment was simply measured as suburban residence (Alba & Logan, 1991)³. Obviously, this measure suits the US context (at a particular point in time) better than the European context of today. We also find some recent studies of neighbourhood attainment of young adults that base their definitions of the hierarchy of neighbourhoods on local poverty rates (Gambaro, Joshi, & Lupton, 2017; Ham et al., 2014).

Quite a few use different measures of the central tendency of the local income distribution (Gustafsson et al., 2017; Sampson, 2012; Sharkey, 2008; South, Huang, Spring, & Crowder, 2016). Composite measures that acknowledge the multi-dimensional nature of neighbourhood quality and resemble multiple deprivation indices are used (Rosenbaum & Friedman, 2001; White & Sessler, 2000). While these multi-dimensional measures have the advantage of

³ Note that the authors explicitly acknowledge that this is a crude measure of attainment. However, in their context it most certainly is an informative measure.

taking account of the composite nature of neighbourhood quality, they have the drawback of lacking transparency.

Finally, there are studies that use some measure of racial or country background composition in the neighbourhood population (Gabriel, 2016; Sampson, 2012; Waren, 2013). The Oslo context equivalent of this would have been the share of inhabitants in the neighbourhood with an Asian or African background (Nordvik & Osland, 2016).

The question of what may yield gaps in neighbourhood attainment between descendants of immigrants and of natives, relates to spatial assimilation or lack thereof. According to the classical US literature on immigration and assimilation, children of immigrants should have a favourable position on the housing market in comparison to their first-generation immigrant parents. Descendants of immigrant parents are both more acculturated and better structurally integrated than their parents - two processes identified as keys to spatial integration. (Alba & Logan, 1993; Cutler, Glaeser, & Vigdor, 1999; Massey, 1985; Park, 1925). Children of immigrants born in the “host” country have been exposed to/have learned the native language since early childhood. They have studied within the same educational system, have native friends and classmates, and consequently, compared to first-generation immigrants, they are also likely to have acquired norms and values more similar to those of the native population.

A naïve application of the spatial assimilation hypothesis would lead us to predict that children of immigrants and of natives locate similarly in the neighbourhood hierarchy; at least this would be the case after controlling for relevant characteristics. Casual observation and prior studies of integration and the dynamics of segregation indicate that this is not necessarily the case (Sharkey, 2012; Turner & Wessel, 2013; White & Sessler, 2000). At least three sets of mechanisms can contribute to differences in the neighbourhood attainment of children of immigrants and natives:

- i) Neighbourhood preferences can differ between country backgrounds. In our specific Oslo context, for example, it has been demonstrated empirically that mobility responses to increased income vary considerably with country background (Turner & Wessel, 2013).
- ii) Discrimination can constrain access to some neighbourhoods for members of some country background groups.

Applicants for vacant housing in the Norwegian rental housing market, who have names indicating a non-Norwegian country background, experience less positive responses than do applicants with Norwegian names (Andersson, Jakobsson, & Kotsadam, 2012). However, owner-occupation is the dominant tenure in Oslo, and no studies reveal direct discrimination in this market. A number of US-based studies have demonstrated how Black and Hispanic families are constrained by discrimination in the credit market (see e.g. Yinger, 1997). However, there is no indication that descendants of African and Asian parents experience such constraints in the Oslo housing market. This can be related to the large-scale public mortgage programme, ‘the Starter Loans’, in which individuals of Asian and African background are over-proportionally represented (Aarland & Reid, Forthcoming).

- iii) Descendants of Asian and African parents are probably less favourably endowed than descendants of native Norwegians, i.e. the children of immigrants have less access to resources through their extended family. In this context, resources refer primarily to wealth and networks. Moreover, there are systematic differences in neighbourhoods of residence at the age 16 between two groups considered.

Neighbourhood conditions experienced during childhood and adolescence feed into neighbourhood attainment in later life, through at least three channels. First, this may be due to the neighbourhood’s impact on the accumulation of human capital (Brattbakk & Wessel, 2013; G. Galster, 2012; G. C. Galster, 2008). Secondly, it has also been demonstrated that an

effect on neighbourhood attainment over and above that on human capital can also exist (Sharkey, 2008; Vartanian, Walker Buck, & Gleason, 2007). Adapted preference, information or cognitive constraints, may contribute to this. A study of intergenerational transmission of exposure to poverty in Stockholm (Ham et al., 2014) found that growing up in a high poverty area increases exposure to poverty over the period after leaving the parental home, even after controlling for own income. And thirdly, inertia in neighbourhood attainment can be due to ties to specific neighbourhoods or to specific people (e.g. parents, siblings or friends) residing in those specific neighbourhoods (Hedman, 2013; Nordvik & Andersson, 2015).

Characteristics of the neighbourhood in which a person has spent her/his adolescence are part of the endowments the person brings with her/him into early adulthood. Intergenerational persistence in location in the neighbourhood hierarchy is explicitly studied in a few recent papers (Gustafsson et al., 2017; Sharkey, 2008). These studies from the US and Sweden show an intergenerational elasticity of neighbourhood attainment higher than what is usually found for intergenerational elasticities of earning. Both Sharkey and Gustafsson found that parental income at adolescence has a far weaker effect on neighbourhood attainment in adulthood than the effect of neighbourhood quality (as measured by average income).

There is substantial literature on returns to education in terms of earnings and how these returns differ between immigrants and native born (Ferrer & Riddell, 2008; Zorlu, 2012). According to most studies, wage gaps between immigrants and natives shrink after completing a university degree. Two mechanisms stand out as probable explanations of this. Firstly, as immigrants experience statistical discrimination in the labour market, education can work to signal both ability and eagerness to adapt to the demands of employers (Spence, 2002; Zorlu, 2012). Secondly, the educational level among first generation immigrants from non-western countries is, on average, lower than that of the native population. This might mean that these groups have come from more limited educational cultures, and consequently,

those immigrants who enter higher education may comprise a more selected group than their native counterparts.

A somewhat similar pattern has been found for neighbourhood attainment: higher education increases neighbourhood attainment. The effect of education is stronger for members of a minority (Alba & Logan, 1991; White & Sassler, 2000).

Starting out from spatial assimilation theory and the empirical studies described above we formulate three hypotheses.

- i) Descendants of parents with an Asian/African background reside in less affluent neighbourhoods than do descendants of native Norwegians.
- ii) Improvement in neighbourhood attainment as the educational level increases is greater for descendants of immigrants than it is for descendants of native parents. Hence, at higher educational levels the disadvantages of having an African/Asian background are lower.
- iii) Even controlling for education and income, there is an intergenerational inertia in neighbourhood attainment.

These hypotheses will be tested within the frame of our multivariate empirical models.

3. The Oslo context

Our study area is Greater Oslo, defined as Oslo municipality and the 22 municipalities in Akershus County⁴. At the start of 2011, the total number of inhabitants in this region was 1.1 million. Over the last decades, two factors have contributed to a changed socio-spatial landscape in Oslo. One is the substantially increased share of inhabitants with a non-

⁴ Oslo, as most metropolitan regions, is not any closed region with natural borders. In the literature there exists almost an infinity of ways to delimit Greater Oslo. A bit arbitrarily and pragmatically, we have chosen to study the administrative units (counties) of Oslo and Akershus.

Norwegian country background (Wessel, Turner, & Nordvik, 2018); the second is that there has been both strong economic growth and a marked change in the industrial structure (Wessel, 2015). In the 1960s, 25 percent of the employed population worked in manufacturing; in 1990, this share was down to 12 percent and now it has dropped to 5 percent. Wessel summarizes these two changes by saying that Oslo has completed its transformation into a globalised post-industrial city.

The urban landscape of Greater Oslo, as in other cities, is divided. A telling analysis by Wessel (2015) illustrates this. First, rank the adult population according to post-tax income and split them into quintiles. Next, check how large a part of the population within each post-tax income quintile has to move in order to be evenly represented in each neighbourhood. About 22 percent of the top 20 percent of the income distribution needs to relocate in order to obtain an even distribution. The average share (across income quintiles) that needs to relocate in order to obtain an even distribution is 0.13. Moreover, these figures have not changed much over the period 1993-2011.

The share that has to move in order to obtain an even distribution over neighbourhoods coincides, of course, with the dissimilarity index. Segregation according to country background (as measured by the dissimilarity index) varies between groups: for the Pakistani population it was 0.53 in 2011, for the Sri Lankans, 0.60 and for the Iranians, 0.32 (Friedrichs, Magnusson Turner, & Nordvik, 2014).

As compared to many other European cities, Oslo has a high share of home-ownership, also among most groups of immigrants. Furthermore, temporarily-let housing units dominate the rental sector; the stock of purpose-built private rental housing and public rental housing is small. In our context, it means for example, that the country group differences in spatial residential patterns documented in the remainder of the paper are probably not driven by housing market discrimination. However, we cannot rule out the possibility that the

neighbourhood outcomes of descendants of parents of Asian and African origin are affected by discrimination in the labour market.

The neighbourhood hierarchy as we define it is based on the median income level in the neighbourhoods (for a more concise definition, see section 4). Figure 1 shows Lorenz curves of the neighbourhood incomes early (1995) and late (2010) in the period studied as an illustration of the inequality of income levels between neighbourhoods.

Figure 1 to be inserted about here

Visual inspection of the figure reveals that the inequalities between neighbourhoods have increased a bit from 1995 to 2010. This is confirmed by the Gini coefficients: in 1995, the Gini was 0.16, while in 2010 it had increased to 0.21. Both the calculated Gini coefficients and the Lorenz curves in figure 1 illustrate the inequalities between neighbourhoods, not between individuals in neighbourhoods. This is so because we have based them on neighbourhood incomes that are not population weighted. Neighbourhood differences are persistent, but not completely static. The correlation between 1995 and 2010 incomes at the neighbourhood level is 0.78.

4. Data

Our analyses utilise a register based longitudinal data set covering the years from 1993 to 2011. This data set consists of the whole population and has been compiled by Statistics Norway by combining information from a large number of administrative registers such as tax, education, social security and population registers (Røed & Raaum, 2003).

We start out with all individuals with either a Norwegian, African or Asian country background who were born between 1975 and 1987 and resided in Greater Oslo at the age of 16 together with at least one of their parents. Only person-year observations of individuals who resided independent of their parents in Greater Oslo after completion of their education

are kept in the sample. Hence, we use an unbalanced sample (as opposed to e.g. Ham et al., 2014). The final sample contains 324,925 person-year observations from 66,446 unique persons - each person observed for an average of 4.9 years. Out of these observations, 7,473 unique persons are descendants of parents of Asian or African background.

The period when one undertakes higher education is for many a period with an unstable and changing residential location. We do not aim to capture neighbourhood attainment over this period; our aim is to study residential patterns after completed education. Consequently, we only use person-year observations of individuals who are above 24 years of age. Education is heterogeneous and we simplify it considerably by aggregating it into three classes of educational achievements:

- a) A Master's degree taken at a University or at a University College, or a higher-ranking education. For short we denote this 'a higher degree'.
- b) A Bachelor's degree or equivalent. Typically this is a 3 (4) year-long educational programme leading to a Bachelor's degree, or its equivalent - certification as a social worker, teacher, nurse, engineer etc. This is termed 'a lower degree'.
- c) Neither a) nor b).

Information about the date the degrees were obtained has been taken from the central Norwegian register of educational achievements. Norwegian educational institutions report degrees to the register. Students studying for a degree outside Norway are entitled to a grant and the register is updated with information from applications for this grant. Consequently, we regard this variable as highly reliable.

The main dependent variable in the analyses is the median pre-tax income (including earnings returns on capital and transfers) of males aged 35 to 60 years, in the neighbourhood (Y).

Cohabiting couples without children are not identified as one household in the data. In Norway, non-marital cohabitation is rather common; hence, measures of household income are not available. Rather than basing our measure of neighbourhood affluence on the income distribution of all, we have chosen to use information on prime working age males on the presumption that this best captures neighbourhood quality; in this we follow e.g. G. Galster, Andersson, and Musterd (2015). The prime working age ‘filter’ is used to avoid the neighbourhood income measure being too strongly affected by students and retired males, as their current income probably deviates from their long term financial capacity.

The next question is how to transform the middle-aged male income-based measure of neighbourhood attainment observed annually from 1993 up to 2011 in neighbourhood r ($Y_{na}^{r,t}$), into a common scale, enabling meaningful comparisons over time. An obvious possibility is to deflate all annual values to a common scale (e.g. 2011-NOKs) using the consumer price index. This would be problematic, as real incomes have risen steadily over the period.

We measure the neighbourhood income as Z-scores ($Z_{na}^{r,t}$) - that is, we measure neighbourhood income in number of standard deviations away from the mean. Z-scores are calculated using year-specific information on both mean incomes and standard deviations. In part, this transformation is done to ensure comparability over time; in part, it is done to enhance the intuitive interpretation of the measure of a location in the hierarchy of neighbourhoods.⁵ More concisely $Z_{na}^{r,t}$, where the subscript na identifies the neighbourhood income as opposed to individual incomes, is defined as:

⁵ An alternative way of measuring location in the hierarchy could have been to use the rank, e.g. measured by percentiles. We prefer the Z-scores as they better capture the fact that in the middle of the distribution, many neighbourhoods are very similar, while the differences are far larger in the tails. E.g. the difference between the 50th and the 55th percentile may be negligible, while the difference between the 90th and the 95th percentile is far larger.

$$(1) Z_{na}^{r,t} = \frac{Y_{na}^{r,t} - \overline{Y_{na}^t}}{\sigma_{Y_{na}^{r,t}}}$$

where $\overline{Y_{na}^t}$ is the mean ‘median middle-aged male pre-tax income’ across neighbourhoods, and $\sigma_{Y_{na}^{r,t}}$ is the standard deviation of the same variable. This implies e.g. that a z-value of -1 signifies a neighbourhood ‘median middle-aged male pre-tax income’ one standard deviation below the mean.

Neighbourhoods are defined as census tracts. Our study area consists of 1,895 tracts with an average of around 600 inhabitants.

The other income variables are also measured as Z-scores (equivalent to equation (1)). All z-normalisations are undertaken separately for each income year. Table 1 below shows that means reported are, for most income variables, a bit away from zero. This is because the z-normalisation is done at the population level, while we here consider a selected sample. If, for instance, one considers our prime dependent variable (the neighbourhood income) one sees that its mean is well below zero for both individuals of native and African/Asian origin. Hence, individuals in our sample live on average in below average neighbourhoods. This is so because we have captured them early in their life course: the maximum age is 36, and the average is a bit more than 29.

Neighbourhood income at 16 is obviously a result of parents’ choices under the constraints provided by e.g. their income. Hence, neighbourhood income at 16 and parental income at 16 are expected to correlate positively. In order to discriminate between them in the later analyses we have therefore orthogonalised them by using the residuals from an OLS-regression of neighbourhood income (at 16) with parents’ income as the sole explanatory factor. This residual is denoted ‘N’hood income residual’.

Families/households choose residential location; thus characteristics of household composition should be part of an empirical model of neighbourhood attainment. We use a simple measure of family income. For individuals residing without a spouse, the family income equals his/her income. For individuals residing with a spouse we use the sum of the incomes of the spouse divided by a factor of 1.5. This particular weight is used in order to capture economics of scale within the family. Children anticipated is a dummy variable equal to unity in the two years before the arrival of the first-born child. The need for incorporating characteristics of the spouse in empirical analyses of neighbourhood attainment is demonstrated by Gabriel (2016).

In order to test whether there are any differences between residing in an income homogeneous neighbourhood at 16 or in a more varied neighbourhood, we use the Coefficient of variation in male incomes in the neighbourhood (CV).

In Table 1 below, we give some descriptive statistics of the variables used in subsequent analyses. For simplicity, we just report descriptive statistics for one single year - 2008.

Table 1 to be inserted about here

Note also that we are interested in differences in returns to education between natives and descendants of parents of Asian or African origin in terms of neighbourhood attainment. We are not interested in differences in the returns to education taken in different countries.

Therefore, we restrict the sample of non-Norwegians to those who have entered the country before the age of 14. Most of the immigrant descendants in our sample were born in Norway.

5. Empirical analyses

The main vehicles in the empirical analyses are a set of straight forward OLS-models estimated on our set of person-year observations. Repeated observations of the same person over many years are not independent; this we account for by using robust standard errors

clustered at the person level. The empirical analyses are built up in a kind of decomposition logic. First, we compare mean neighbourhood attainments, across the six groups defined according to country background and completed educational achievements.

Next, we study how neighbourhood attainment is affected by education and country background after controlling for a battery of variables. Important variables in this context include parental income and income in the neighbourhood of origin, both measured at the age of 16. By doing this we are able to identify how much differences between groups are due to differences in endowments.

Table 2 to be inserted about here

One could very well argue that the significance levels of the estimates in Table 2 are intrinsically uninteresting. What is more interesting is patterns of differences between the means. The significance of these differences can be tested by ordinary F-tests of coefficient equality (tests available on request).

Our estimations of the interdependency between neighbourhood affluence, country background and educational attainment reveal some very clear, distinct and significant patterns.

- i) Descendants of immigrants from Africa and Asia live in less affluent neighbourhoods than do the children of native Norwegians. This is true at any of the educational levels studied here.
- ii) The affluence level of the residential neighbourhood is higher the higher the resident's educational level.

- iii) The premium of education in terms of location in the neighbourhood hierarchy is higher for persons with an African or Asian country background than it is for native Norwegians.
- iv) The positive effect of education does not neutralise the negative effect of having an African or Asian background.

The ‘effects’ revealed by the estimated coefficients can be regarded as quite small. When we use the z-value of the neighbourhood income as our dependent variable, we measure neighbourhood income in number of standard deviations away from the mean. The results imply, e.g. that on average, a native with a higher degree will reside in a neighbourhood with a 0.36 standard deviation higher neighbourhood income than an African/Asian individual without any higher education. One way to illustrate the magnitude of estimated differences is to use a ranking of neighbourhoods on a 1-100 scale and see how the estimated differences move an individual on this ranking scale.

Using this scale, we find that an average descendant of a Norwegian parent without any higher education is placed as number 44 in the neighbourhood ranking. A lower degree moves him/her to position 40, while a higher degree lifts the resident to position 36. For a descendant of African or Asian parents, the corresponding positions in the neighbourhood hierarchy are 66, 56 and 49 respectively. To put it brutally, the spatial attainment of a child of Asian or African immigrants, does not (on average) reach to the attainment of a descendant of native parents, even if the child has a higher degree. This is an unpleasant aspect of Oslo society.

Different endowments

Table 3 below presents two versions of a multivariate model. One that includes a measure of family income and one that does not include this variable. The purpose of estimating both models is that one of the main channels of impact of education on neighbourhood attainment is the effect it has on earnings. By comparing M1 and M2 we can inform a discussion of

whether (higher) education affects neighbourhood attainment also through non-earnings channels and whether this differs between descendants of natives and descendants of Asian or African immigrants.

Table 3 to be inserted about here

Starting with M1 we observe that, after controlling for income, there are no significant differences between educational groups among the natives. Among the Africans and the Asians, we see that higher education reduces the penalty in neighbourhood attainment, even if we control for income. Hence, it seems that higher education affects descendants of natives primarily through its impact on earnings, while there are non-earnings channels in the impact on young adults of Asian and African descent. An alternative interpretation is that education moves preferences of minority youths in the direction of the preferences held by the majority population. Having observed this we restrict the remainder of the interpretations to M2.

People in the age span above 24 possess a past. This past includes characteristics of the neighbourhood of origin and parents' placement in the socio-economic hierarchy. In M2, we find that parents' income significantly affects the neighbourhood attainment of their offspring subsequent to nest-leaving. Moving parental income one standard deviation up increases the neighbourhood attainment by (only) 0.03 standard deviations; starting at the lower quartile this is an increase of the rank in the neighbourhood hierarchy by three positions. The magnitude of the effect of the neighbourhood income level is four times larger than that of parental income. This corresponds well with the results of other studies addressing intergenerational dependencies in neighbourhood attainment (Gustafsson et al., 2017; Sharkey, 2008). If we do the same exercise as for the parental income, we find that one standard deviation improvement in neighbourhood income at 16, improves the expected position in the neighbourhood hierarchy by 12 positions on a 0-100-scale. This provides an

excellent illustration of what Sharkey (2008) termed ‘intergenerational transmission of context’.

One word of caution is pertinent regarding comparisons of the magnitude of the estimated effects of variations in parental and neighbourhood-of-origin income. Parental income measured at one specific year is affected by random variations through a transitory component, and this would bias the estimated coefficients downward. Neighbourhood income at 16, on the other hand, is smoothed over the population and less exposed to random variations. A study of intergenerational income mobility found that using parental income at one particular age, rather than over a 20 year period, biased the estimated intergenerational income elasticity downward by around 30 percent (Gregg, Jonsson, Macmillan, & Mood, 2013).⁶ However, even assuming a bias of our estimates of a similar magnitude would not alter our qualitative conclusion that neighbourhood-of-origin income has a far stronger impact on later neighbourhood attainment than that of parental income.

Using M2, the coefficients show that the expected difference in neighbourhood attainment between a native without any higher education and one with a lower degree is 0.019 and that the difference between one with a higher and lower degree is 0.022 SD’s. Both these two premiums are significantly larger than zero at a 5% level of significance. In terms of rank in the 0-100-scale, this corresponds to jumps of only two positions for each educational step, starting at the lower quartile for the individual without any higher education.

The same comparison for an individual of Asian or African country background with a lower degree reveals a premium of 0.075 SD’s, while the additional premium of a higher degree is 0.051 SD’s. The former is significant at a 1-percent level, while the latter has only a 10-percent level of significance. The higher premiums of the descendants of immigrants naturally

⁶ We thank one of the reviewers for pointing this out.

yield larger jumps (again starting at the lower quartile) in the 0-100-scale. A lower degree gives a jump of seven positions, while the difference between higher and lower degrees corresponds to a further jump of five positions. Using a different measure of attainment, White and Sassler (2000) also demonstrate that education affects neighbourhood attainment more powerfully for minorities, than for the majority.

Comparing the estimated premiums of education, we see that they are higher for the children of the immigrant groups considered here. The differences in the premium of obtaining a lower degree is significantly higher for the African-Asian group (at a $p < 0.01$). The additional premium of taking a higher degree is, however, not significantly larger for the immigrant group. From the analyses conducted here, it is not possible to conclude whether this is due to different mechanisms of selection into higher education in the two groups, different types of higher education or some causal effect.

A brief decomposition exercise

In order to decompose the differences between neighbourhood qualities (as measured by the normalised median income in the neighbourhood) some years subsequent to ending education, into effects of educational achievement and country background, we utilise the estimated models in a kind of decomposition exercise. Using estimated coefficients taken from each of the three models, we predict the z-value of the neighbourhood income for the six groups formed by combining country background and educational categories. Holding country background constant we calculate educational premiums and holding education constant, we calculate a measure of immigrant disadvantage.

Table 4 to be inserted about here

The table reveals some very clear and telling patterns. In terms of neighbourhood attainment, the educational premiums (i.e. the difference between individuals with different educational

levels) are very much higher for the immigrant group considered here. Even more striking is the fact that when we control for individual incomes, the educational premium for the natives vanishes - i.e., the educational premium in neighbourhood attainment for the natives works through an educational premium in earnings. For the Asian/African group on the other hand, more than one-half of the educational premium remains even after controlling for the situation at the age of 16 and for current household income.

It is tempting to speculate that descendants of immigrants start out with a disadvantage that can be reduced by obtaining higher education. Maybe this result is generated by some kind of signalling mechanism, e.g. that higher education works as a sign of eagerness to integrate or even assimilate.⁷ Another possible explanation is that for the natives education is more a channel for maintaining privileges achieved by the parental generation, while it is a means for upward social mobility for the children of Asian and African immigrants.

When we look at the disadvantage of having an Asian/African background, controlling for education, a corollary to the result above emerges. For those without any higher education, the neighbourhood income is 0.245 SD's lower for those with an immigrant background. A large part of this can be explained by the situation at the age of sixteen: we see this from the fact that when controlling for such factors, the estimated Asian/African disadvantage falls by 54 percent. Furthermore, the Asian/African disadvantage decreases quite strongly in education. Hence, for the immigrant group considered here higher education really seems to be a path towards augmented - but not full - spatial integration.

Empirical results in context: Greater Oslo as compared to Metropolitan Sweden and the US

⁷ The fact that the educational premium for descendants of non-natives is almost 50 percent higher in the model that does not control for income supports this signaling hypothesis.

Even though no large stock of empirical studies explicitly addressing neighbourhood attainment in early adulthood exists, there is an emerging literature, which conveys quite a bit of variation in how neighbourhood hierarchies are defined. On the one hand, this is more a reflection of the multidimensionality of neighbourhood quality, than a problem. On the other hand, it makes comparisons of empirical results across studies less straightforward.

In order to illustrate the degree of persistence in neighbourhood attainment at the lower end of the distribution across countries and minorities, we follow the approach of Gustafsson et al. (2017). They used Sharkey's seminal study Sharkey (2008) and compared the shares of the young adult population originating in a neighbourhood belonging to the lower quartile of neighbourhoods, and who remained in the lower quartile, also at the age of around 30. The three studies compared here are not identical in terms of samples. Our models are estimated on observations from one urban region, Greater Oslo, the Swedish study utilizes data from the three largest metropolitan regions of Sweden while the US study is estimated on a national sample.

Table 5 to be inserted about here

The cross-country comparisons in Table 5 are a bit coarse as neither the minority-majority distinction nor the delimitation of neighbourhoods is identical in the studies of the three countries. Still, there is a clear pattern of similarities and differences. In all three countries, the minorities remain in the lower quartile of neighbourhoods to a far higher degree than individuals belonging to the majority do. While more than every second minority young adult remains in this position in the US, a bit more than every third are in this position in Norway and Sweden. Among young adults with a majority background, persistent location in the lower quartile is far less prevalent, and there are no clear country differences.

The two last lines of the table also illustrate the prominent role played by education for the possibility to avoid persistent location in the lower segments of the neighbourhood hierarchy, especially for the minority group.

Concluding remarks

We started out hypothesising that residential location subsequent to nest leaving and completion of education within an urban landscape is far from a random process. Our empirical analyses reveal structures similar to those hypothesised. Descendants of immigrants of Asian or African origin reside in less affluent neighbourhoods in Greater Oslo than descendants of native Norwegian parents do. Gains in neighbourhood attainment through obtaining higher education are stronger for immigrant descendants. One of the most striking results is, however, that even if immigrant descendants complete an advanced university degree they do not catch up with native descendants without any university degree.

Another striking result arises when we consider how present location in the socio-spatial hierarchy of neighbourhoods correlates with the income of parents and location in the neighbourhood hierarchy at the age of 16. Both these characteristics correlate positively with later position in the hierarchy of neighbourhoods. The effect of neighbourhood is far stronger than that of parental income, and this is so even though we have controlled for the dependency between these variables by orthogonalising them. Norwegian society sometimes prides itself on its equality of opportunity. Our results do not support this pride.

The results for Oslo reported in this paper are probably not qualitatively different from what one can find in other European cities. One should, however, be cautious about generalisations. In a recent book, Oslo was described as a new immigrant city on its way to maturity (Wessel, 2015). It is far from obvious that the mechanisms and patterns we have captured in a particular phase of this way to maturity represent any steady-state situation regarding sorting

and self-selection in the urban landscape of Greater Oslo. Moreover, we gather that most European cities can be plausibly described as immigrant cities on their way to maturity – and that cities are in different phases along this road. For this reason, accumulating knowledge about self-sorting and selection in European cities and comparing them can extend our understanding of probable paths of future spatial integration in Europe. Such a knowledge base can enhance our possibilities to capitalise on opportunities created by diversity and to avoid its dangers.

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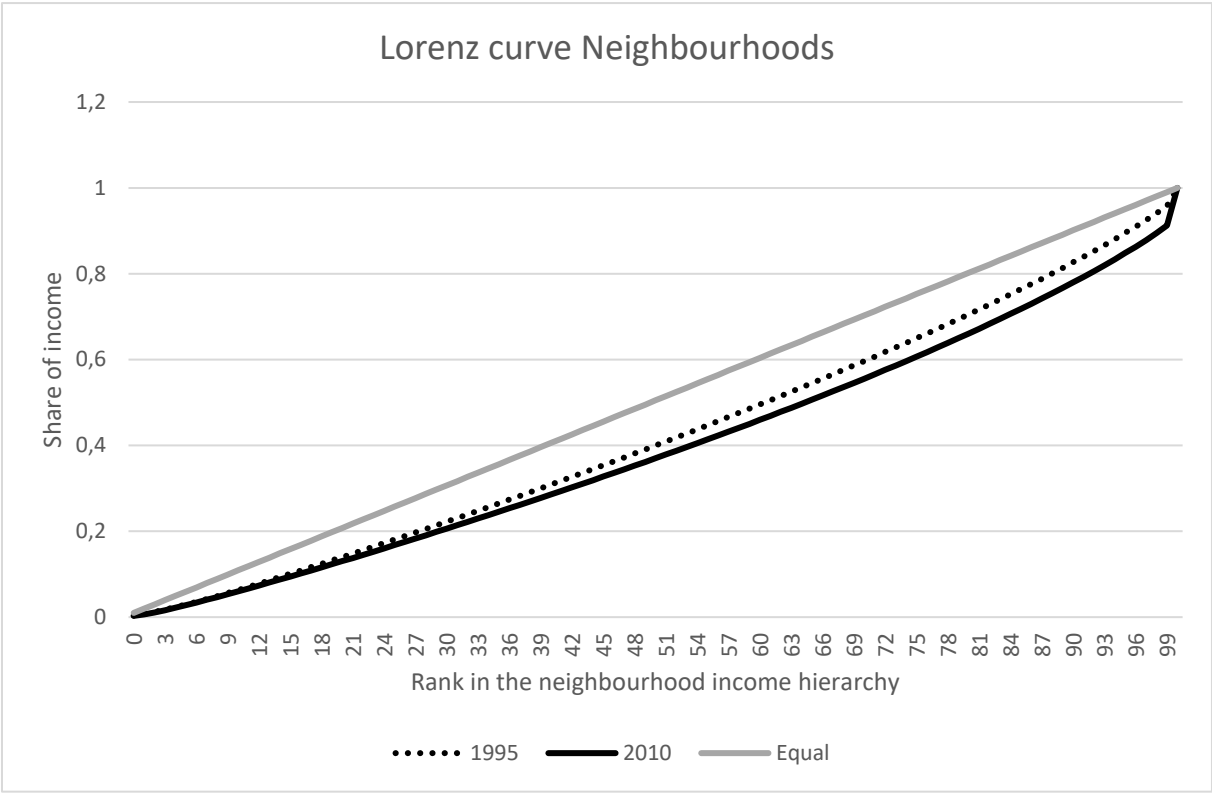
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Figures

Figure 1 – Distribution of neighbourhood incomes, 1995 and 2010, Lorenz curve



Tables

Table 1 – Descriptive statistics 2008

	Natives		Asian and African	
	Mean	SD	Mean	SD
Neighbourhood income (Z)	-0.275	0.652	-0.557	0.635
No higher education	0.679	0.467	0.800	0.403
Lower degree	0.201	0.400	0.121	0.326
Higher degree	0.120	0.326	0.083	0.276
Age	29.45	2.51	28.77	2.49
Years since completed education	5.67	2.67	5.77	2.50
Female	0.505	0.500	0.556	0.497
Spouse present	0.514	0.500	0.530	0.500
Spouse Asian/African	0.016	0.126	0.366	0.481
Parity	1.71	0.83	2.12	1.40
Children	0.487	0.767	0.753	0.983
Children anticipated	0.131	0.337	0.095	0.293
Income (z-standardised)	0.222	0.740	0.004	0.733
Parents income at age 16 (z)	0.717	1.677	-0.646	1.35
Neighbourhood income at 16 (z)	0.165	0.788	-0.458	0.763
N'hood income residual	0.037	0.744	-0.347	0.710
CV neighbourhood income at 16	0.951	1.55	0.808	1.742
Persons	35,614		3,763	

Table 2 – Mean neighbourhood attainment across educational and country background. OLS-model with no additional controls.

	Neighbourhood Z	
	Coeff	se
No higher education, native	-0.269**	0.003
Lower degree, native	-0.216**	0.005
Higher degree, native	-0.158**	0.007
No higher education, Asian/African	-0.514**	0.007
Lower degree, Asian/African	-0.394**	0.018
Higher degree, Asian/African	-0.325**	0.023
R-sq-adj	0.176	
Person-years	324,925	
Persons	66,446	

** denotes a coefficient significantly different from zero at a 1-percent level. * denotes a 5-percent level. Robust standard errors clustered at the individual level.

Table 3 – OLS-models of Neighbourhood income of young adults subsequent to ended education

	Neighbourhood Z M1		Neighbourhood Z M2	
	Coeff	se	Coeff	se
No higher education, native	Ref	Ref	Ref	Ref
Lower degree, native	-0.008	0.006	0.019**	0.006
Higher degree, native	-0.006	0.010	0.041**	0.010
No higher education, Asian/African	-0.105**	0.009	-0.113**	0.009
Lower degree, Asian/African	-0.053**	0.017	-0.038*	0.017
Higher degree, Asian/African	-0.025	0.024	0.013	0.024
Age	-0.147**	0.009	-0.140**	0.009
Age Squared	0.003**	0.0001	0.002**	0.0001
Years since completed education	0.002	0.002	0.006**	0.002
Female	0.021**	0.004	0.013**	0.004
Spouse	0.113**	0.004	0.112**	0.004
Spouse Asian/African	-0.161**	0.010	-0.169**	0.010
Parity	-0.0002	0.002	-0.001	0.002
Children	0.060**	0.003	0.060**	0.003
Children anticipated	0.032**	0.004	0.037**	0.004
Family income (z-standardised)	0.105**	0.004		
Parents income at age 16 (z)	0.028**	0.001	0.030**	0.001
Neighbourhood income at 16 (z)	0.136**	0.003	0.139**	0.003
CV neighbourhood income at 16	0.008**	0.002	0.007**	0.002
Intercept	1.70**	0.130	1.60**	0.131
R-sq-adj	0.081		0.076	
Person-years	324,629		324,629	
Persons	66,364		66,364	

** denotes a coefficient significantly different from zero at a 1-percent level. * denotes a 5-percent level. Robust standard errors clustered at the individual level.

Table 4 – Decomposition of Educational premiums and Immigrant disadvantages

	No controls	M2, controls not income	M1, controls included income
Predicted neighbourhood attainment $E(Z_{na})$			
No higher education, native	-0,269	-0,269	-0,269
Lower degree, native	-0,216	-0,251	-0,277
Higher degree, native	-0,158	-0,228	-0,274
No higher education, Asian/African	-0,514	-0,382	-0,378
Lower degree, Asian/African	-0,394	-0,307	-0,323
Higher degree, Asian/African	-0,325	-0,256	-0,292
Educational premium, lower vs no, natives	0,053	0,019	-0,008
Educational premium, higher vs lower, natives	0,058	0,022	0,002
Educational premium, lower vs no, Asian/African	0,120	0,075	0,052
Educational premium, higher vs lower, Asian/African	0,069	0,051	0,028
Asian/African disadvantage, no higher education	0,245	0,113	0,105
Asian/African disadvantage, lower degree	0,178	0,057	0,045
Asian/African disadvantage, higher degree	0,167	0,028	0,019

Table 5 – Percentage originating and remaining in the lower quartile of the neighbourhood hierarchy, Sweden, US and Norway

	Minorities	Majority
US	52	7
Sweden	34	7
Norway	38	9
Norway, no higher education	43	11
Norway, some higher education	25	6