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ABSTRACT

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This paper investigates certain issues of economic and ethnic segregation from the perspective of children in the three metropolitan regions of Sweden by using a relative new operationalization of the neighbourhood concept. Neighbourhoods are clustered by population share of visible immigrants in proportion to share of native born residents. The target variable under study is child income based on income of parents. Inequality in child income 1990, 1996 and 2002 is studied by decomposing additively decomposable inequality indexes. Based on this, measures of residential economic polarisation and residential ethnic polarisation are obtained. Of major significance is that residential polarisation increased for all three regions and for both sub-periods 1990-1996 and 1996-2002. For example, while in the Stockholm region 7 percent of inequality in child income in 1990 was due to differences in mean income across neighbourhoods, the proportion had increased to as much as 22 percent in 2002. Ethnic residential polarisation increased as well and we report a relatively large overlap between economic and ethnic polarisation. Based on estimated regression models, we conclude that increased returns to parental education have forcefully contributed to larger economic polarisation among children in Swedish metropolitan regions.

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1. **Introduction**

In many European countries, a high proportion of immigrants from low and middle income countries and their dependent children reside in less-privileged neighbourhoods of the larger cities. Such a spatial concentration – where the physical distance between neighbourhoods functions as a barrier – is often seen as obstacle in the integration process into the host society. For children, residential segregation signifies socialisation into certain social settings which probably yield long-run consequences. As the consequence of residential segregation between recently arrived immigrants (and other deprived groups) and the majority, a polarisation of living conditions can arise, a polarisation that can foster social tensions and unrest.

In this paper we present an empirical study of the extent and changes of residential economic polarisation and ethnic polarisation in the country of Sweden. Sweden has long been known for its equal distribution of income and its ambitious social programs. However, the large economic downturn which took place in the beginning of the 90s led to widespread joblessness from which the labour force participation rate has not fully recovered. The trend of increasing earnings and income inequality that started during the first part of the 80s has continued. Housing policies have been dismantled. Together, these processes have increased residential polarisation. Concurrently, the fact, that the immigrants have been concentrated to metropolitan regions – especially to their less attractive areas, has begun to draw the public attention. Residential segregation, economic as well as ethnic, has been placed on the political agenda. For the first time ever, a metropolitan policy for Sweden was formalised in 1998.[1] This policy consists of programs aimed at supporting disadvantaged areas. (Andersson, 2006)

Although there have been attempts to counteract residential segregation in Sweden, relatively few systematic efforts (in contrast to the US, for instance) have been made to measure the changes in and reasons for residential segregation.[2] This paper is an attempt to shed new light

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[1] Ministry of Finance (1998).
[2] Janson (1987) studied residential segregation (defined as the difference in residential patterns between Social Democratic party voters, i.e. the working class, and the total population) in the three metropolitan areas of Stockholm, Göteborg and Malmö from 1936 to 1976. The probably first study on ethnic segregation in Greater Stockholm showed that that residential segregation varies in scale among different immigrant groups (Andersson-Brolin, 1984). Biterman (1994) examined economic segregation between low and high income earners and ethnic segregation between native born residents, immigrants from European countries and immigrants from non-European countries in the Stockholm region during 1970–1985. Such a rank order of

on these issues. We apply a division of metropolitan regions into neighbourhoods which are used as a building block when investigating residential polarisation in each of Sweden's three metropolitan areas. We derive results for 1990, 1996 and 2002, making it possible to show changes over time. Further, we link mean income at the neighbourhood level to education and other household characteristics in order to understand reasons for the changes.

According to various explanatory models for why segregation arises,[3] residential segregation can be seen both as an outcome of individual decisions – voluntary and involuntary – as well as decisions at the policy level. Most often, residential segregation between population groups is defined as their respectively uneven distribution across subunits (here neighbourhoods) of the city,[4] which results in various groups within society not sharing physical and/or social space. People in urban areas tend to arrange themselves in accordance with their particular characteristics in terms of socioeconomic or ethnic status, religion, lifestyle or other cultural properties. The income gaps between population groups are especially important in this process. In our societies, segregation is associated with such negative phenomena as dissimilarities, fragmentation, distance and conflict, for individual households as for the whole society.

This discussion addressing segregation issues deals primarily with adults´ preferences, choices and decisions. The perspective of children is often not present, though the strongest argument concerning residential segregation should take their situation into account. Children are typically not the primary decision-makers regarding household choice of residency though one could argue that the location where they grow up is a significant aspect of their childhood and might affect their future life. In the political tradition of Western countries, equality in opportunities for children – included small differences in residential pattern – is considered desirable. However, the segregation studies where children are primary target are few. That

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immigrant groups after degree of segregation has been confirmed by other studies (Andersen, 2001; Bevelander, Carlssson & Rojas, 1997, Ministry of Health and Social Affairs 1997). Some studies have noted a decline in segregation in certain respects. A study by the Swedish National Integration Office of ethnic residential segregation in the three metropolitan areas and in six medium-sized Swedish municipalities during the period 1997–2003 showed that the segregation trend is not uniform. Segregation has declined in Malmö, for instance, but has remained largely unchanged in Stockholm and Göteborg in latest years (National Integration Office, 2004, 2005). Biterman and Franzén (2007) showed significant increase in ethnic but not in economic segregation since 1990.

[3] See Huttman, Blaw, and Saltman J, eds. (1991).
[4] See for example Allison (1978) or White (1986).

motivates us to study residential segregation from the perspective of children, concentrating on income gap across neighbourhoods, which we name "polarisation".

Our target variable is "child income", a variable based on the disposable income and the expenditure needs of the child's family. Applying an additively decomposable income index to income tax data, we define economic polarisation as the proportion of inequality in child income in a particular region that can be attributed to differences in mean income across neighbourhoods. That is, in the operationalization use of the concept "polarization" we follow Zhang and Kanbur (2001), remembering that there are also other measures of the concept (see for example Estaban and Rao, 1994 and Wolfson, 1994). As a first research question we examine how large a part of the inequality in child income in each of the three regions is due to inequality across neighbourhoods and how this spatial polarisation has changed.

Our second research task is to investigate ethnic polarisation and the link between spatial polarisation and ethnic segregation. We claim that it is relevant to cluster neighbourhoods according to level of concentration of visible minorities.[5] Our question is: How large proportion of inequality in child income can be attributed to the level of concentration of visible minorities in the diverse clusters of neighbourhoods and how has such a proportion changed? Related to this, we ask for the overlap between economic and ethic polarisation. Finally, we aim to better understand why differences in neighbourhoods´ mean child income are so much greater in 2002 than in 1990. Using regressions we investigate the roles played by parental education and other household characteristics and their payoffs.

In the paper we confirm that mean child income changed little between 1990 and 1996, while larger increases took place from 1996 to 2002. During the period studied, inequality in child income increased profoundly. At the neighbourhood level there is considerable mobility across years in average child income, which means that while some neighbourhoods had gained positions in the ranking of neighbourhoods, others lost. A major finding is that in all regions and between all years of investigation, residential economic polarisation has increased. For example, using the Mean Logarithmic Deviation we find that while in the Stockholm region 7 percent of inequality in child income in 1990 was due to differences in

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[5] i.e. those whose appearance and/or behaviour is perceived as foreign by the majority of the population.

average income across neighbourhoods, the corresponding proportion (of a higher inequality value) had increased to 16 percent in 1995 and to as much as 22 percent in 2002.

We also show that ethnic polarisation has increased in all three metropolitan regions. Most remarkably, while mean child income in neighbourhoods with few or no visible minorities was much higher in 2002 than in 1990, mean income remained more or less constant in neighbourhoods where a high share of residents are visible minorities. We report a relatively large overlap between economic and ethnic polarisation. Finally we find that increased returns to parental education are a major factor leading to larger economic polarisation among children in Swedish metropolitan regions.

The rest of the paper is laid out as follows: In the next section we introduce the building block of neighbourhood used in this study, while the central concepts of child income, its inequality and polarisation are defined in Section 3. Results on the extent of spatial polarisation and its change are reported in Section 4 while Section 5 contains results on ethnic polarisation. In Section 6 we investigate the changed relation between parental education and other household characteristics and mean child income at the neighbourhood level. The paper ends with a concluding section.

2. Neighbourhoods in the three major urban regions of Sweden

In all empirical studies of residential segregation, the choice of primary spatial unit is central (the issue of scale). In many cases, researchers by necessity have to work with administrative units as other alternatives are not available. However, a choice of for example municipalities as subunits is in the Swedish context not well motivated since municipalities are hardly comparable because of large differences in population size. Most municipalities have created their own systems of area classification for planning purposes. Such planning areas are not very suitable either, since they may differ significantly in population size and their borders usually change relatively often. Here, however, we are able to use a classification based on sociological considerations. [6] A "neighbourhood" is an area smaller than a municipality, but larger than a city block and normally larger then a planning area (it often aggregates few

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[6] Other units used for Sweden include the municipality (Grönqvist, 2006) and a circle of 250 meters around each individual, see Musterd and Andersson (2006) who studied the three metropolitan areas.

planning areas), and as such it represents a convenient intermediate level. Residential segregation affects basic conditions for social interaction between the city's inhabitants. Since the neighbourhood represents a natural social arena for its residents, it is an understandable choice of a sub-area. Furthermore, the division into neighbourhoods is not dependent on administrative changes, which means the borders do not change during the period under review – a great advantage while studying segregation processes (see Biterman and Franzén, 2007).

The Neighbourhood is defined as a built-up area that:
- is demarcated by "natural borders" (larger streets, green areas, etc).
- corresponds to a city district or a residential area.
- possesses a number of inhabitants large enough to provide a basis for certain private or public services.
- can be considered as an "area of identification" by its inhabitants.

A geographical division into neighbourhoods in accordance with these criteria has only been established for the metropolitan regions, i.e. municipalities of Stockholm, Göteborg and Malmö with neighbouring, suburb municipalities[7], see Table 1.

/Table 1 about here/

Of Sweden's 9 million inhabitants, 3.3 million or 37 percent live in the three metropotitan ares. The region around Stockholm, the capital, in the mid-eastern part of the country is the largest, and consists of not less than 24 municipalities (city level units) and 337 neighbourhoods. Eight municipalities make up the Göteborg region on the west coast, which is the second largest region by population and which has 205 neighbourhoods. As is usually the case for these types of studies, we treat Malmö in the south together with the eight municipalities surrounding it as a separate region, although if the national border to Denmark

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[7] For technical reasons, the area under review should be limited to neighbourhoods with more than 500 inhabitants. This excludes neighbourhoods with very few inhabitants, usually industrial areas. A neighbourhood commonly houses between four thousand and ten thousand inhabitants, except in a few odd cases. Given that segregation is an urban phenomenon, the focus is on urban neighbourhoods, which means that sparsely populated and rural areas on the outskirts of suburban municipalities have been excluded from the analyses. Note that the number of sparsely populated neighbourhoods changes over time as new housing is built and new inhabitants move in

is disregarded, it can be considered to be the eastern (and smaller) part of the Copenhagen-Malmö region. The Malmö region has 154 neighbourhoods.

Immigrants (defined here as foreign-born persons) make up 12 percent of the population in Sweden, but as many as half of them live in the three metropotitan areas a profound concentration. In 2002 the foreign born in the Stockholm region made up 18 percent of the population, and the corresponding proportion is only slightly lower in the Göteborg and Malmö regions, see Table 1.

There are more differences across regions regarding country of origin, a variation that to some extent mirrors the varying geographic distance to sender countries. Finland is the largest sender country of immigrants living in the Stockholm region and ranks number two among sender countries to the Göteborg region, but has a much lower ranking in the Malmö region. In contrast, Poland is the second largest sender country for immigrants living in the Malmö region, but ranks much lower in the other two regions. If Yugoslavia and its successor states are considered to be one unit, it is the single largest sender of immigrants living in the Göteborg and Malmö regions. Iraq ranks high as a sender country for all three regions (number two in the Stockholm region, number four in the Göteborg region and number three in the Malmö region). Other highly ranked sender countries are Iran (particularly in the Göteborg region) and Turkey (particularly in the Stockholm region). In the Swedish context it is generally perceived that various forms of discrimination and social exclusion are social problems for some, but not all, foreign born. For reasons discussed in Section 5 we will therefore distinguish between visible immigrants and other immigrants.

3. Defining child income; its inequality and polarisation.

From the various perspectives of residential segregation possible to analyse, this paper uses the economic situation of children, and we make comparisons within the population of children.[8] We define a child as a person under age 18 and measure his or her economic situation based on the disposable income of the parents. An important component of a

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[8] The alternative of making income comparisons among all individuals, and not only children, as reference would probably not have much affected the picture here reported. This, as mean disposable equivalent income for children in Sweden typically is found to bee relatively close to mean disposable income for the entire population. For example Gustafsson, Johansson and Palmer (2003) report, based on the Household Income Survey, and a chosen equivalence scale, that during the period 1991 to 1998 average disposable child income was around 10 percent lower than average disposable income for the entire population.

household's disposable income is wages subject to income tax. In addition, there can be income from capital received as dividends and interest as well as income from capital gains from selling stocks and property. Tax files provide this information delivered to Statistics Sweden. We work with data on all children, not a sample.

Other income components we add to receive "gross income" are receipt of social insurance benefits (sickness benefits and unemployment compensation, for example) and transfers such as child allowances, housing benefits and social assistance. Statistics Sweden obtains this information from various registers kept by the authorities paying the transfers. Statistics Sweden also obtains information from the tax authority on income taxes paid by the households and after subtracting this component from gross income, the disposable income is obtained. We derive our target variable "child income" by adjusting the disposable income of each household with children with an equivalence scale used by Statistics Sweden.[9] In a final step, each person under 18 is assigned this income and we perform the analysis of child income using individuals (children) as the unit of analysis.[10]

Some measurement problems make our measure of child income somewhat noisy. As is the case for all studies based on tax data, undeclared earnings and capital income are not covered in the data; it is difficult to have a well-based view of how important such underreporting is. While there are thus reasons to expect child income to be underestimated in some cases, there are reasons to expect it to have been overestimated in others. The latter occurs as we work with a narrow income pooling and need unit. In any particular case we do not know whether the real income-sharing unit also includes one or more persons over 18 years of age; a person that is not the father or mother of the child. Probably the largest category of such persons consists of older siblings living with the parents. Typically such persons are non-workers signifying low personal income while adding to the real expenditure needs of the family.

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[9] In order to be able to compare different families' or households' economic standards, it is advisable to relate income to the dependency burden. It is usually done by an equivalence scale. A simple such is the number of persons in the family. However, it is possible to refine such a scale by giving each person a weighting depending on age and number of family members and various equivalence scales have been constructed. In this study we use an equivalence scale recommended by the National Boards of Health and Welfare, which starts at 1.16 for the first adult person in the household, 1.92 for two adults, and adds weight of 0.56, 0.66 and 0.76 for each child aged 0-3 years, 4-10 years and 11-17 years respectively. SOU 2002:73, p 89 – 132 discusses the issue of choice of equivalence scale from the perspective of Swedish experiences.

[10] This means we follow a now common practice, used in, for example, contributions to Vleminckx and Smeeding (2001), and when studying child poverty, see Bradbury, Jenkins and Micklewright (2001).

In order to quantify economic polarisation we decompose inequality in child income across neighbourhoods. We use two additively decomposable inequality indices, namely the Theil index defined as:

$$I(y) = \frac{1}{n} \sum_{i}^{N} \left(\frac{y_i}{\mu}\right) \log\left(\frac{y_i}{\mu}\right)$$

and the Mean Logarithmic Deviation (MLD) defined as:

$$I(y) = \frac{1}{n} \sum_{i}^{N} \log\left(\frac{y_i}{\mu}\right)$$

where μ is the mean income, y_i income of i:th individual and N the total number of individuals. Of the two indices, is the MLD index more sensitive to inequality at the bottom of the income distribution. If the sample is divided into k groups (here neighbourhoods), the Theil-index can be decomposed as:

$$I(y) = \sum_{g}^{k} \frac{n_g}{n} \left(\frac{\mu_g}{\mu}\right) I_g + I\ (\mu_1 e_1, ..., \mu_k e_k)$$

and the MLD can be decomposed as:

$$I(y) = \sum_{g}^{k} \frac{n_g}{n} I_g + I\ (\mu_1 e_1, ..., \mu_k e_k)$$

where n_g is the number of individuals in the gth group (neighbourhoods), I_g inequality within the gth group, μ_g the mean of the gth group income, and e_g the n_g vector of ones.

Within this framework we define *residential economic polarisation* as the ratio between between-group income inequality and total income inequality, a measure which by definition

ranges from 0 to 1.[11] The "between-group" part represents the inequality that would vanish if mean income of all neighbourhoods were to be equally large. In a similar manner we define *residential ethnic polarisation* based on a classification of clusters of neighbourhoods formed after ethnic composition. Details on this classification are provided in Section 5.

The measures of residential and ethnic polarisation (for each metropolitan region) are related which can be seen from the following identities:

Total income inequality =

Within neighbourhood inequality + Between neighbourhood inequality (1)

Between neighbourhood inequality =

Between ethnic cluster inequality + Within ethnic cluster inequality (2)

Substituting (1) into (2) we arrive at:

Total income inequality = Within neighbourhood inequality + Between cluster

inequality + Within ethnic cluster inequality (3)

The relative sizes of the two sign terms on the right provide an indication of the overlap between residential segregation and economic segregation. We can for example define a measure of overlap as:

Between ethnic cluster inequality / Between neighbourhood inequality (4)

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[11] Thus the index is similar, but not identical, to the Neighbourhood Sorting Index (NSI) introduced by Jargovsky (1996). NSI is defined as the ratio between the standard deviation of neighbourhood mean income and the standard deviation of the income among units in the entire territory studied.

By definition the ratio defined in equation (4) assumes values from 0, as is the case if there is no ethnic segregation, up to 1.0 (or 100 percent) which is the case if economic and ethnic segregation strictly follow each other.

To repeat: The tax data we work with contain all individuals and households living in the three regions studied. Thus there are no sample errors in our numbers. The database at our disposal , the Social Medicine Database from Centre for Epidemiology at The National Board of Health and Welfare, contains annual data from 1990 to 2002. We chose to make computations for the first and last years and also include computations for 1996 which makes it possible to investigate changes across two six-year sub-periods. Of the two, the first is characterised by some economic growth initially followed by a deep downturn of the economy, while the latter sub-period was a period of rapid recovery.

4. The extent of spatial polarisation and its change

/Table 2 about here/

Table A1 in the Appendix provides an overview of development of child income in 2002 for the three regions combined and which refers to the 652 000 children living there. It can be seen that mean child income in 1996 was only 4 percent higher than in 1990, but between 1996 and 2002 it had increased by as much as 28 percent. Further, inequality in child income increased between both pairs of years according to all inequality measures computed. Table 2 shows example of neighbourhoods as we present the six neighbourhoods with lowest and highest average child income in 2002, as well as some neighbourhoods at the centre of the distribution. Mean child income is actually lower 2002 than in 1990 for most neighbourhoods at the bottom of the distribution, while neighbourhoods at the top have experienced rapid increase. Most parents in the poorest neighbourhoods have a short education, but the share where both parents only have a compulsory education or less has decreased substantially between 1990 and 2002, More than two third of children living in the poorest neighbourhoods have a foreign background from middle and low income countries in 1990, while the corresponding is the case among less than six percent of children living in the richest neighbourhoods. In 2002 more than 4/5 of the parents in the low income neighbourhoods are

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born in middle in low income countries. Different from high income neighbourhoods many parents in the poorest neighbourhoods have low or no labour market attachment, and the fraction has increased between the two years studied. Further it can bee noted that poor neighbourhoods are located in all three metropolitan regions while in contrast data shows that all of the six richest neighbourhoods are located in the Stockholm region.

/Table 3 about here /

Table 3 reports mean child income and income inequality using the additively decomposable indices and for comparison, the Gini coefficient for each of the three regions. We also decompose inequality in child income for the combined three regions by metropolitan region (the lower part of the table). Stockholm has the highest mean child income and the gap to the other two regions has widened slightly. This development becomes visible when we decompose inequality in the combined three regions by region (the lower rows of Table 3), as larger fractions can be attributed to the between region part. Still very little of the inequality in child income in the three regions combined is due to differences in mean income across regions; for 2002 less than 2 percent.

Table 3 also shows that by all indices used, child income is most unequally distributed in the Stockholm region in 1996 and 2002, and less unequal in the Göteborg region with the difference to the Malmö region being slight. The pattern of increased inequality in child income is found to prevail in all regions during the first sub-period, but for the second sub-period increases are recorded according to all three indices in the Stockholm region only.

With this background we now look at mean income at the level of neighbourhood. Figure 1 shows that the distribution of mean child neighbourhood income in 2002 has moved to the right and is more unequal than that of 1990. Figure 2 shows a close relation between mean child income in 1990 and 2002 and the fitted regression line is fairly steep. However, there is also a variation across the regression line.

/Figure 1 and Figure 2 about here/

During the 12 year period studied here, few dwellings were constructed or renovated and changes in the physical structure of the neighbourhoods were relatively minor, particularly during the first part of the period as the construction industry had almost collapsed. However, demographic events led to many changes in the composition of the studied population in the neighbourhoods. More than half of the children observed at the beginning of the period left the population as they became adults. They were replaced by newborns. In addition, many parents and their children moved out of their neighbourhoods to other destination in the same region, another region or another country. There was also mobility into the regions from other parts of the country as well as from abroad. With this background in mind, we understand why we can observe a considerable mobility of neighbourhoods in the distribution of child income across the years.

/Table 4 about here/

Table 4 shows the extent of mobility of neighbourhoods in the distribution of child income in the Stockholm region as a matrix. We have classified neighbourhoods into deciles for each year and show the association as percentages of units observed the first year. We see that slightly more than half of the neighbourhoods located in the bottom decile in 1990 remained in the same decile in 2002. Mobility is even larger in the middle of the distribution where a relatively small change in mean child income can cause the neighbourhood to change deciles. Most stability is found at the top of the distribution, although actually one-third of the neighbourhoods that were at the top in 1990 had moved down one or two deciles. While clearly neighbourhood mobility most often is short, Table 3 reports a few cases with long distance mobility. For example, one neighbourhood moved from the first decile in 1990 to the ninth in 2002 while another moved from the ninth decile down to the first.

/Table 5 about here/

We are now in a position to answer the first research question, that of the extent and changes in residential economic polarisation. Table 5 reports the within and between terms for all three regions and all three years computed for the two inequality indices. First we compare the three regions. Residential economic polarisation is found to be largest in the Stockholm region for both measures and for all years investigated. In 1996 and 2002, residential polarisation was smaller in the Göteborg region than in the Malmö region.

Now let us compare changes over time. Most profoundly, residential polarisation is found to have increased between each pair of years, in each region and according to both inequality indices. The increase is rapid. While for example the MLD index indicated that in the Stockholm region, 7 percent of inequality in child income could be attributed to differences in mean income across neighbourhoods, the corresponding proportion had increased to 16 percent in 1996 and as much as 22 percent in 2002.

Looking more closely at our data (and not reported in a table), and dividing neighbourhoods into deciles, a comparison of the first and last details in this development are worth mentioning. Mean child income for the first decile increased by as little as 7 percent, while for the tenth it increased by 43 percent. Even more revealing is to examine income components in the data. In the first decile, average mother income decreased by 19 percent and average father income by as much as 29 percent. Counteracting the decreased reliance on parental market income, those in the first decile became more relying on social assistance; the rate of social assistance receipt went up from 18 to 26 percent. In contrast, in the top decile, average mother earnings rose by 42 percent and average father earnings by as much as 48 percent; here the rate of social assistance receipt fell from 6 to 2 percent.

5. Ethnicity and polarisation

In order to study the degree of ethnic polarisation we classify neighbourhoods by the ethnic composition of its population. Such a classification can obviously be made using various criteria. Here we apply a criterion based on the rate between the number of visible immigrants born (of all ages) and the number of native born (of all ages). In the Swedish context it is generally perceived that various forms of discrimination and social exclusion are social problems for some, but not all foreign born persons. People from distant countries with low or medium-high GDPs are easy to recognise by the colour of their skin or by their names and they are treated unfavourably in many cases. Many such immigrants have entered Sweden as refugees during recent few decades and these minority groups often have only a short history of residing in Sweden. In contrast, people from neighbouring countries, mainly from Scandinavian countries and from countries in Western and Eastern Europe (with high GDP) are most often difficult to distinguish from natives by looks, colour of skin or by given name,

and are usually not discriminated by majority population. These – non-visible – immigrant groups commenced their residence in Sweden relatively earlier. The majority among them came to Sweden as labour immigrants and are now well integrated into Swedish society.

A more detailed description of the classification is as follows: For each of the three large city regions the average rate of visible foreign born residents to native born population is computed and put equal to 1.0, and for each neighbourhood the corresponding ratio is computed.[12] According to this definition the number of non-visible foreign-born persons in a particular neighbourhood does not affect the ethnic classification of a neighbourhood. Based on the value for this variable, the neighbourhood is classified into one of eight different categories. Neighbourhoods with populations of less than 500 individuals are not classified. There are three categories of neighbourhoods with varying degrees of homogenous native-born population (values less than 0.25, 0.25 – 0.49, 0.50 – 0.79), two categories of integrated neighbourhoods (values 0.80 – 1.24, 1.25 – 1.99) and three categories with a concentration of visible minorities (2.0 – 3.99, 4.00 – 9.99, 10 and higher). From 594 neighbourhoods classified, 416 are homogenous with predominantly native born population, 104 integrated and 74 have a large concentration of visible minorities.

For each of the eight clusters of neighbourhoods defined in this manner as well as for the category of unclassified, we compute mean child income and inequality in child income. Based on these numbers we decompose child inequality to show the extent of ethnic polarisation and its changes. The results are presented in the Appendix Table A2. While there is not much of a pattern of differences in child income inequality across ethnic categories, more is found regarding mean income as well as changes in mean income. Not surprisingly, the highest mean incomes are found in neighbourhoods with few visible foreign born residents while the mean incomes are slightly lower in the clusters of neighbourhoods with

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[12] See Biterman and Franzén (2007) for the exact definition. It is to some extent arbitrary where to place the dividing line between visible and non-visible immigrants. Here people born in Hungary, Russia and Romania (together with those from for example Finland, Norway, Germany and United States) for example, are not considered visible immigrants. This in contrast to persons born in Yugoslavia (and its successor countries), Bulgaria, Greece, Spain and Italy who are considered visible immigrants (together with people from Africa, Africa and Latin America). Nevertheless, we can argue that all immigrants from countries in dispute comprise no more than 6-7 per cent of all non-visible immigrants, according to this categorisation. If we categorised them as "visible" instead, it would not change the clustering of neighbourhoods in some profound way, nor have some impact on the final results and conclusions. Another potential limitation of the definition is that it is based only on people who are born outside Sweden. Thus it does not take into consideration that some second generation immigrants are visible different from the majority.

more mixed compositions of the population. The lowest means are found in clusters with a dominant composition of visible minorities. This gap in mean income across ethic clusters has increased; an increase which has been rapid and has occurred during both sub-periods.

/Figure 3 about here/

An example from the Stockholm region can illustrate how differently mean income has developed in clusters with varying ethnic composition (see Figure 3). Observe first cluster 2 where 120 000 children lived and where rather few had larger concentration of visible minorities. With the second lowest concentration of visible immigrants, average child income was the highest among the clusters in 1990. Its mean income had increased by 9 percent in 1996, and between 1996 and 2002 by another 36 percent; in 2002 mean income was as much as 48 percent higher than in 1990. Now observe cluster 8 with 11 000 children and the highest concentration of visible minorities. From 1990 to 1996 child mean income decreased by 10 percent, and the recovery from 1996 to 2002 was as little as 11 percent, thus mean income in 2002 was almost exactly the same as in 1990. The gap in mean child income between cluster 2 and cluster 8 increased from 1:1.5 to 1:1.8 and then up to 1:2.2. The development in the two other regions are rather similar.

From this report of enlarged differences in mean income between clusters of neighbourhoods formed according to ethnicity, it comes as no surprise that our measure of ethnic polarisation shows increases in all regions and for both sub-periods. In 1990 the ethnic polarisation was largest in the Stockholm region, but the increase was most rapid in the Malmö region and in 2002 this region had the largest ethnic polarisation. While less than 2 percent of inequality in child income in the Malmö region could be attributed to differences in mean income across the clusters in 1990, this proportion had increased to 10 percent (when MLD is applied) in 2002.

/Table 6 about here/

Finally, we study the overlap between residential economic and ethnic polarisation using the definition spelled out in Section 3. Table 6 provides the numbers. The table shows that the overlap has actually changed differently over time in the three metropolitan areas. In the Stockholm region, the overlap decreased during the first sub-period, and then remained

constant. In contrast, the overlap increased between each pair of years in the two other metropolitan areas. The Malmö region in 2002 stands out as having the highest overlap.

6. Understanding differences in mean child neighbourhood income

Why are mean neighbourhood child incomes diverging? The main income source for parents is earnings and earnings are in turn related to level of education. Increased rates of return to (parental) education therefore provide one potential factor behind increased spatial polarisation, while a changed educational composition of neighbourhoods could provide another. We investigate the explanatory power of the alternatives by estimating income functions for 1990 and 2002 at the neighbourhood level. The omitted category is both parents having long university educations. There are five variables measuring the proportion of parents with particular education levels. In the specification we also include one variable for the proportion of single parents, four for the proportion of children with various foreign region of birth and period of residency, three for indicating parent's labour market attachment and two dummy variables for metropolitan region. We use the coefficient estimates as well as the variable values to analyse possible causes for polarisation to increase over time. Are the main reasons changed parental education, family structure and labour market involvement by parents? Or are the main causes changed pay-offs of the variables that affect child income?

/Table 8 about here/

The intercept in Table 8 indicates the mean child income of a neighbourhood in the Stockholm metropolitan region where all children have two parents with strong labour market attachments and long university educations; no child is foreign born. The two models predict that (in case mother's average age at child birth is 30 and the child lives in Stockholm), mean child income in 2002 to be as much as 49 percent higher than in 1990. In contrast, if both parents have educations not higher than at the compulsory level, mean child income is predicted to have decreased by 11 percent.

In addition to the strongly changed effects of parental education, the estimates show positive coefficients for mothers age at first child birth as well as negative coefficients estimated with high t-values for both years analysed for the proportion children from low- and middle-income countries. There are negative coefficients for the metropolitan region dummies, and

positive coefficients for the proportion single parents and for certain coefficients for labour market attachment. Some of the coefficients for labour market attachment are lower in 2002 than in 1990.[13]

/ Figure 4 about here/

We use the parameter estimates for 1990 and 2002 to illustrate the importance of changes in coefficient versus changes in variables for the increased dispersion of mean child neighbourhood income. To construct Figure 4 we start from the 2002 coefficient estimates and predict mean child neighbourhood income using variables as observed for 1990 and 2002. Then we relate the 2002 prediction to the 1990 predictions. On the x-axis we display the change in income due to changes in variables and on the y-axis we display the mean disposable income in the neighbourhood. For each neighbourhood, there is one point showing change at the income level of income in 2002. We find that in most, but not all cases, changes in variables have caused mean child neighbourhood income to increase. However, increases are almost always lower than the 33 percent observed in the aggregate. Further, there is no linear relation between initial income level and change.

/Figure 5 about here/

When we use changes in parameter estimates between 1990 and 2002, and variables in 2002 to predict changes in mean child neighbourhood income in Figure 5, the picture becomes rather different. Almost without exception, neighbourhood child income is predicted to have increased; for a substantial proportion of neighbourhoods, the increase is more than 33 percent. Further, there is a strong positive linear relation between initial income level and income change. Changes in coefficients are thus the major driving force behind the increase in spatial polarisation in child income across neighbourhoods in Swedish metropolitan areas.

When understanding these results it is useful to remember that child income is the sum of several income components: Wages of parents received during a full year, dividends, interests, capital gains as well as various transfers and with income taxes enter with a negative

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[13] When analysing residuals we notice that the model significantly underpredicts mean neighbourhood income for the three neighbourhoods with the highest mean incomes in both year 1990 and year 2002.

sign. Increased coefficients are thus most likely the outcome of several changes. One possible channel is increased rates to return to education in the labour market that has previously been documented.[14] In addition Sweden experienced a tax reform during the period studied. Its components were decreased marginal tax rates as well as the introduction of two tax bases, not as previously one. As a consequence capital gains and interests are now subject to a proportional tax rate of 30 percent. In the old system such incomes were added to earnings and when earned by an average or higher paid person taxed at a high rate. The tax reform is thus an additional possible reason why coefficients have increased.

7. Conclusions

In this paper we have studied economic and ethnic segregation in the three metropolitan regions of Sweden from the perspective of children, using a new operationalization of the neighbourhood concept. Neighbourhoods were clustered according to rate of visible immigrants. The target variable under study was child income computed from the income of parents and considers the expenditure needs of the family in which the child lives. Inequality in child income 1990, 1996 and 2002 was studied by decomposing additively decomposable inequality indexes. Based on this, measures of residential economic polarisation and residential ethnic polarisation were obtained, as well as the overlap between economic and ethnic polarisation. In our approach, residential polarisation is a characteristic not only attributed to neighbourhoods with low incomes, but also to neighbourhoods with high incomes. Further, we studied the relation between parental income, some other household characteristics and mean child neighbourhood income in 1990 and 2002 using regression analysis. These estimates provided the basis for simulations illustrating the importance of changes in variables and in coefficients.

A major finding is that in all three metropolitan areas and for both sub-periods studied, residential polarisation increased. For example, while in the Stockholm region 7 percent of inequality (measured by the MLD index) in child income in 1990 was due to differences in mean income across neighbourhoods, the corresponding proportion of the now larger inequality had increased to 16 percent in 1996 and to as much as 22 percent in 2002.

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[14] See Gustavsson (2006) who analysed wages in Sweden 1992 to 2001 by estimating wage functions.

The study has found that ethnic residential polarisation increased as well across both sub-periods studied in all three cities. Most strikingly we found that mean real income had increased rapidly from 1990 to 2002 in clusters with predominantly Swedish born population. In contrast, mean child income in clusters where many visible foreign born live had not grown. We report a relatively large overlap between economic and ethnic polarisation.

Finally, based on analysing data for neighbourhoods we have found that increased returns to parental variables, mot prominently education, are a major factor leading to larger economic segregation among children in Swedish metropolitan regions. Changes in parental variables contributed less. For example we found that children having two parents with long university educations have a much higher income in 2002 than in 1990. In contrast, during the same twelve years, children with two parents who possess only compulsory educations experienced a slight decrease in child income.

While the overall picture for the three metropolitan areas studied is the same, some differences should be noted. While inequality in child income continued to increase during the second sub-period in the Stockholm region, this was not the case in the other two regions. Further, at the end of the period, the overlap between economic and ethnic polarisation was larger in the Malmö region than in the other two regions studied.

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Table 1
The three Swedish metropolitan regions, number of neighbourhoods, population size and country of origin composition. 2002.

Region	Stockholm	Göteborg	Malmö
Municipalities	Stockholm, Solna, Sundbyberg, Danderyd, Ekerö, Järfälla, Lidingö, Sigtuna, Sollentuna, Täby, Upplands-Bro, Upplands Väsby, Vallentuna, Österåker, Botkyrka, Haninge, Huddinge, Nacka, Salem, Turesö, Värmdö, Norrtälje, Nynäshamn and Södertälje	Göteborg, Kungälv, Ale, Lerum, Partille, Härryda, Mölndal and Kungsbacka	Malmö, Burlöv, Kävlinge, Lomma, Lund, Staffanstorp, Svedala, Vellinge and Trelleborg.
Number of neighbourhoods	337	205	154
Number of urban neighbourhoods with a population larger than 500 persons	271	138	92
Total population as of 2002 (number)	1 0830 600	769 900	528 300
Foreign-born population (number)	324 400	116 400	90 700
Foreign-born population (percent of the total population in the region)	18	15	17

Source: Biterman and Franzén (2007).

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Table 2
Characteristics of neighbourhoods at the bottom, in the middle and at the top of the distribution of average child income in 2002. (Proportions, if not other stated)

	City-region	Disposable income in 1990 (Hundreds of SEK, in 2000 prices)	Disposable income in 2002 (Hundreds of SEK, in 2000 prices)	Children from MLIC 1990	Children from MLIC 2002	Mother's age when child born 1990	Mother's age when child born 2002	Both parents compulsory education 1990	Both parents compulsory education 2002	Borht parents with long university educations (3 years or more) 1990	Borht parents with long university educations (3 years or more) 2002	Single parents 1990	Single parents 2002	Both parents strong labour market attachement 1990	Both parents strong labour market attacheme 2002
S Rosengård	M	776	604	0.61	0.93	25.8	26.8	0.37	0.17	0.00	0.02	0.31	0.22	0.16	0.0
Fittja	S	694	687	0.67	0.86	26.6	27.7	0.39	0.24	0.01	0.02	0.19	0.21	0.24	0.1
Hjällbo	G	793	738	0.58	0.93	27.0	27.5	0.34	0.18	0.01	0.01	0.32	0.36	0.20	0.0
N Biskopsgården	G	827	738	0.48	0.81	25.2	27.0	0.42	0.17	0.00	0.02	0.26	0.28	0.23	0.0
Holma	M	734	751	0.46	0.77	25.8	26.7	0.36	0.12	0.01	0.02	0.31	0.30	0.16	0.0
Södra Rinkeby	S	801	755	0.58	0.83	26.1	27.1	0.40	0.18	0.01	0.02	0.30	0.33	0.24	0.0
Middle-6															
Glesb N Sigtuna	S	992	1261	0.00	0.01	28.1	30.0	0.10	0.04	0.06	0.04	0.13	0.16	0.48	0.6
Fjärås tätor	G	978	1261	0.01	0.01	28.0	28.6	0.07	0.03	0.08	0.06	0.09	0.23	0.44	0.5
Furuskog-Furulund	G	983	1261	0.02	0.04	28.8	30.1	0.07	0.02	0.06	0.10	0.12	0.18	0.51	0.6
Tygelsjö by	M	917	1262	0.01	0.01	28.3	29.3	0.09	0.03	0.04	0.06	0.05	0.13	0.54	0.6
Bandhagen	S	1085	1262	0.06	0.18	27.2	29.1	0.12	0.04	0.03	0.07	0.33	0.37	0.48	0.4
Västergård	S	967	1263	0.10	0.17	26.6	27.8	0.18	0.06	0.02	0.02	0.20	0.34	0.51	0.5
Top-6															
Södra Ängby	S	1299	2049	0.01	0.01	31.9	33.9	0.01	0.00	0.40	0.49	0.09	0.08	0.62	0.7
Ålsten-Äppelv	S	1288	2072	0.00	0.00	31.7	33.0	0.01	0.00	0.35	0.41	0.09	0.11	0.64	0.6
Stocksund-Tranh	S	1357	2088	0.02	0.01	31.3	32.8	0.01	0.00	0.34	0.41	0.11	0.12	0.62	0.6
Karlapl-Strandv	S	1347	2185	0.02	0.02	31.6	33.1	0.02	0.00	0.29	0.29	0.22	0.24	0.53	0.5
Lärkstaden	S	1379	2214	0.02	0.02	31.9	33.2	0.03	0.00	0.33	0.32	0.23	0.20	0.49	0.5
Djursholm	S	1365	2302	0.02	0.02	31.6	32.8	0.02	0.00	0.32	0.39	0.11	0.12	0.53	0.5

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Source: Authors calculations from the Social Data Base.
Note: G = Göteborg Metropolitan Region, M = Malmö Metropolitan Region and S = Stockholm Metropolitan Region.
For a definition of the variables used see Table A2 in the Appendix.

Table 3.
Mean child income and income inequality in the metropolitan areazs of Stockholm, Göteborg and Malmö 1990, 1996 and 2002

	Mean disposable income 100s SEK in 2000 prices	MLD	Theil	Gini	N	Between group inequality as a percent of total inequality (MLD) Percent	Between group inequality as a percent of total inequality (Theil) Percent
Stockholm							
1990	105 2	0.1075	0.1049	0.2392	341 780		
1996	109 8	0.1563	0.1858	0.2867	370 272		
2002	144 2	0.1957	0.2968	0.3174	386 448		
Göteborg							
1990	987	0.0929	0.0948	0.2220	145 286		
1996	101 0	0.1192	0.1403	0.2538	156 608		
2002	125 3	0.1267	0.1344	0.2590	160 539		
Malmö							
1990	974	0.0960	0.0949	0.2231	98 880		
1996	988	0.1293	0.1538	0.2625	103 283		
2002	120 5	0.1487	0.1477	0.2745	104 572		
Within group (region) inequality							
1990		0.1020	0.1009				
1996		0.1426	0.1701				
2002		0.1711	0.2386				
Between group (region) inequality							
1990		0.0006	0.0006			0.6	0.6
1996		0.0010	0.0010			0.7	0.6
2002		0.0030	0.0029			1.7	1.2

Source: Authors calculations from the Social Medicine Database, Centre for Epidemiology at The National Board of Health and Welfare.

Table 4

Neighbourhood mobility in the distribution of child income 1990-2002, the Stockholm metropolitan area

(Row percent)

Decile in 2002	D e c i l e i n 1 9 9 0									
	1	2	3	4	5	6	7	8	9	10
1	53.3	20.0	13.3	3.3	3.3	3.3	0.0	0.0	3.3	0.0
2	24.2	21.2	21.2	21.2	3.0	3.0	3.0	3.0	0.0	0.0
3	9.1	36.4	21.2	21.2	3.0	3.0	3.0	3.0	0.0	0.0
4	6.3	12.5	9.4	28.1	28.1	6.3	3.1	0.0	3.1	3.1
5	0.0	9.1	15.2	9.1	18.2	24.2	12.1	12.1	0.0	0.0
6	3.1	0.0	9.4	21.9	21.9	18.8	18.8	6.3	0.0	0.0
7	0.0	0.0	3.2	3.2	9.7	25.8	29.0	16.1	9.7	3.2
8	0.0	0.0	6.1	0.0	6.1	12.1	21.2	39.4	9.1	6.1
9	3.0	3.0	0.0	3.0	0.0	3.0	9.1	12.1	45.5	21.1
10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.1	27.3	66.7

Source: Authors calculations from the Social Medicine Database, Centre for Epidemiology at The National Board of Health and Welfare.

Table 5.
Inequality in child income and its decomposition by neighbourhood (polarisation) in the Stockholm, Göteborg and Malmö metropolitan areas 1990, 1996 and 2002.

	MLD	Theil	Between group inequality as a percent of total inequality (MLD)	Between group inequality as a percent of total inequality (Theil)
Within group inequality				
Stockholm				
1990	0.1005	0.0980		
1996	0.1350	0.1635		
2002	0.1598	0.2580		
Göteborg				
1990	0.0888	0.0971		
1996	0.1090	0.1300		
2002	0.1131	0.1212		
Malmö				
1990	0.0920	0.0910		
1996	0.1159	0.1404		
2002	0.1287	0.1290		
Between group inequality				
Stockholm				
1990	0.0070	0.0069	7.0%	7.1%
1996	0.0212	0.0223	15.7%	13.6%
2002	0.0359	0.0388	22.4%	15.0%
Göteborg				
1990	0.0041	0.0041	4.6%	4.2%
1996	0.0102	0.0103	9.4%	7.9%
2002	0.0136	0.0131	12.1%	10.8%
Malmö				
1990	0.0040	0.0039	4.3%	4.3%
1996	0.0134	0.0134	11.5%	9.6%
2002	0.0201	0.0187	15.6%	14.5%

Source: Authors calculations from the Social Medicine Database, Centre for Epidemiology at The National Board of Health and Welfare.

Table 6
Overlap between economic and ethnic polarisation in the Stockholm, Göteborg and Malmö metropolitan areas 1990, 1996 and 2002 in percent

Year	Measures based on MLD			Measures based on the Theil index		
	Stockholm region	Göteborg region	Malmö region	Stockholm Region	Göteborg region	Malmö region
1990	55	27	41	53	26	40
1996	45	44	60	40	40	54
2002	46	63	76	38	59	72

Source: Authors calculations from the Social Medicine Database, Centre for Epidemiology at The National Board of Health and Welfare.
Note: For definition of overlap see the text.

Table 7

Regression models explaining mean child income (neighbourhoods are unit of analysis) 1990 and 2002

	Coef.	t	P>|t|	Coef.	t	P>|t|
	1990			**2002**		
Intercept	652.51	4.35	<.0001	652.23	2.13	0.0339
Reference: Greater Stockholm						
Greater Goteborg	-26.14	-4.84	<.0001	-94.96	-9.48	<.0001
Greater Malmo	-31.60	-5.22	<.0001	-112.36	-8.18	<.0001
Age of mother when child was born	24.13	5.54	<.0001	46.47	5.39	<.0001
Reference: Child with Swedish background						
Child MLIC 0-9 years in the country	67.79	0.82	0.4150	-454.69	-3.11	0.002
Child MLIC mt 9 years in the country	-129.97	-2.38	0.0176	-204.32	-2.58	0.0101
Child HIC 0-9 years in the country	16.60	0.08	0.9378	3561.01	6.04	<.0001
Child HIC mt .9 years in the country	-174.37	-2.25	0.0247	-769.14	-3.27	0.0011
Reference: Both parents have long university educations						
One parent with a long university education	-160.37	-1.73	0.0849	-562.37	-2.81	0.0052
At least one parent with short university education	-282.12	-4.05	<.0001	-743.15	-5.70	<.0001
At least one parent with secondary education	-290.45	-4.26	<.0001	-584.88	-4.61	<.0001
Both parents compulsory education	-194.34	-2.09	0.0368	-990.24	-3.30	0.001
One parent compulsory education	-349.54	-5.26	<.0001	-750.48	-4.38	<.0001
Single parents	613.47	23.33	<.0001	494.33	8.38	<.0001
Both parents with strong labour market attachements						
One parent with strong labour market attachment	-214.05	-4.85	<.0001	-397.09	-4.05	<.0001
Both parents with low labour market attachement	-652.33	-11.06	<.0001	-558.99	-3.92	0.0001
Both parents with no working or unemployment income	-552.78	-5.13	<.0001	-96.78	-0.55	0.5804
Adjusted R²	0.84			0.86		

Source: Authors estimations from the Social Medicine Database, Centre for Epidemiology at The National Board of Health and Welfare.
For a definition of the variables used see Table A2 in the Appendix.

FIGURES

Figure 1

Kernel Density estimate (Epanechnikov) for mean disposable income (in year 2000 prices) in
neighbourhoods for year 1990 and year 2002.

Source: Authors estimations from the Social Medicine Database, Centre for Epidemiology at
The National Board of Health and Welfare.

Figure 2

Changes in mean neighbourhood child income 1990 to 2002
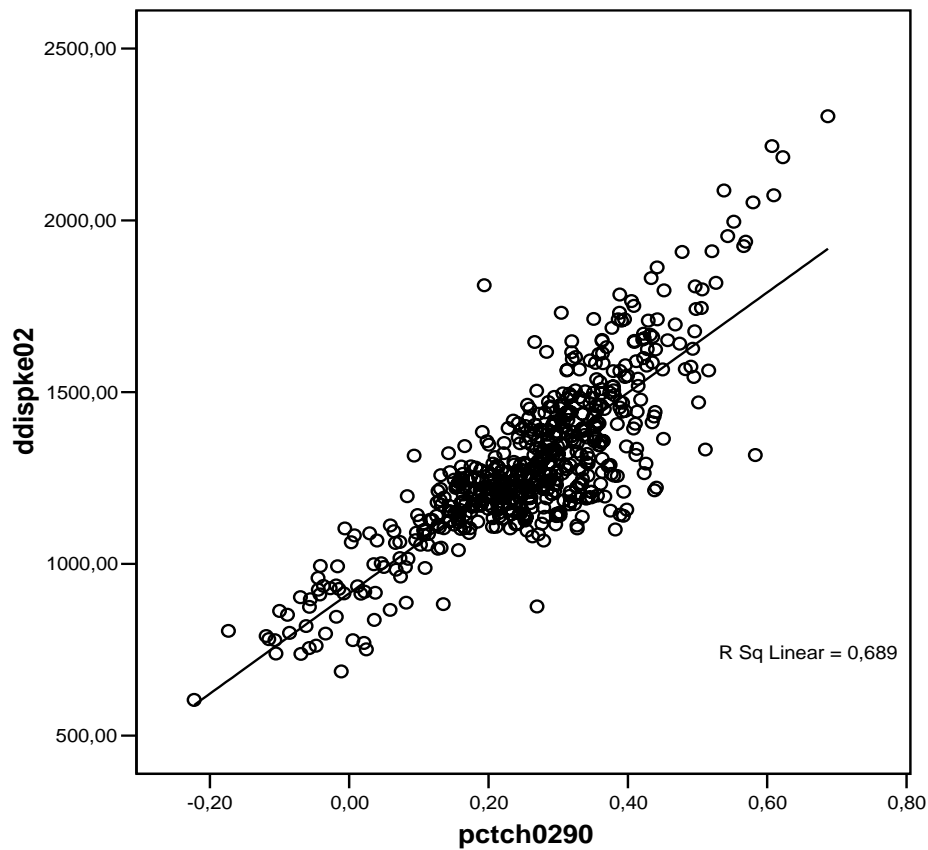
Pctch0290 = percentage change between 2002 and 1990
Ddispke02= mean disposable income in each neighbourhood in 2002

Source: Authors calculations from the Social Medicine Database, Centre for Epidemiology at The National Board of Health and Welfare.

Figure 3

Mean disposable child income in clusters of neighbourhoods with different ethnic compositions 1990, 1996 and 2002 for the Stockholm metropolitan area

Development of mean disposable income in different neighbourhoods by year ant ethnic classification:
Stockholm
(in relation to mean income in whole Stockholm each year)

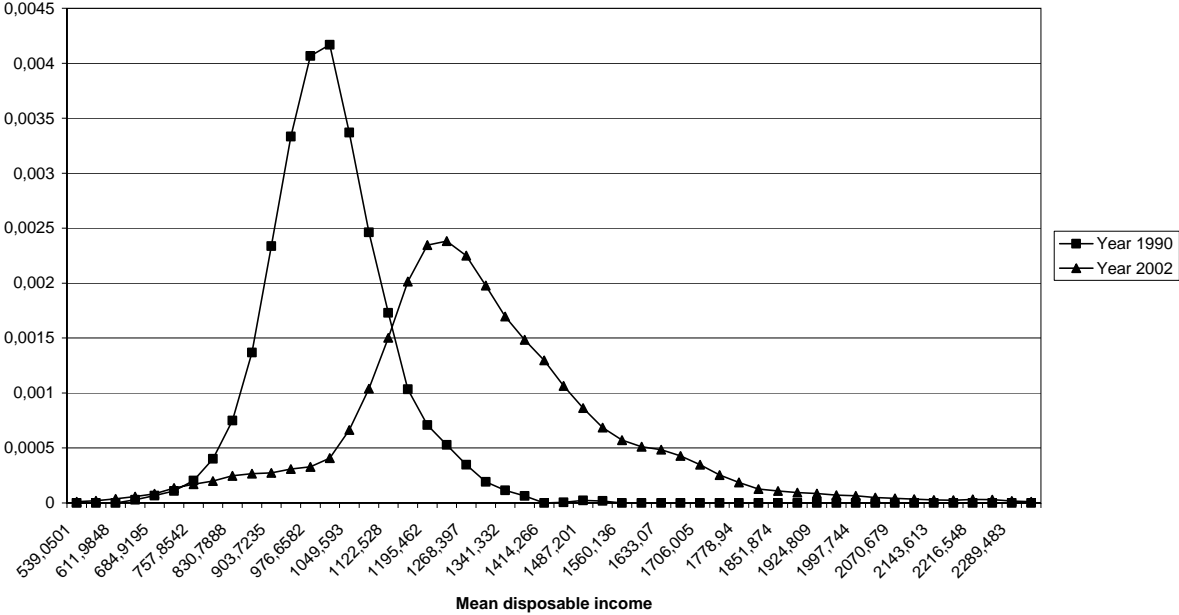

Source: Authors calculations from the Social Medicine Database, Centre for Epidemiology at The National Board of Health and Welfare.

Figure 4

Predicted changes in mean child neighbourhood income from 1990 to 2002 due to changes in distribution of variables.
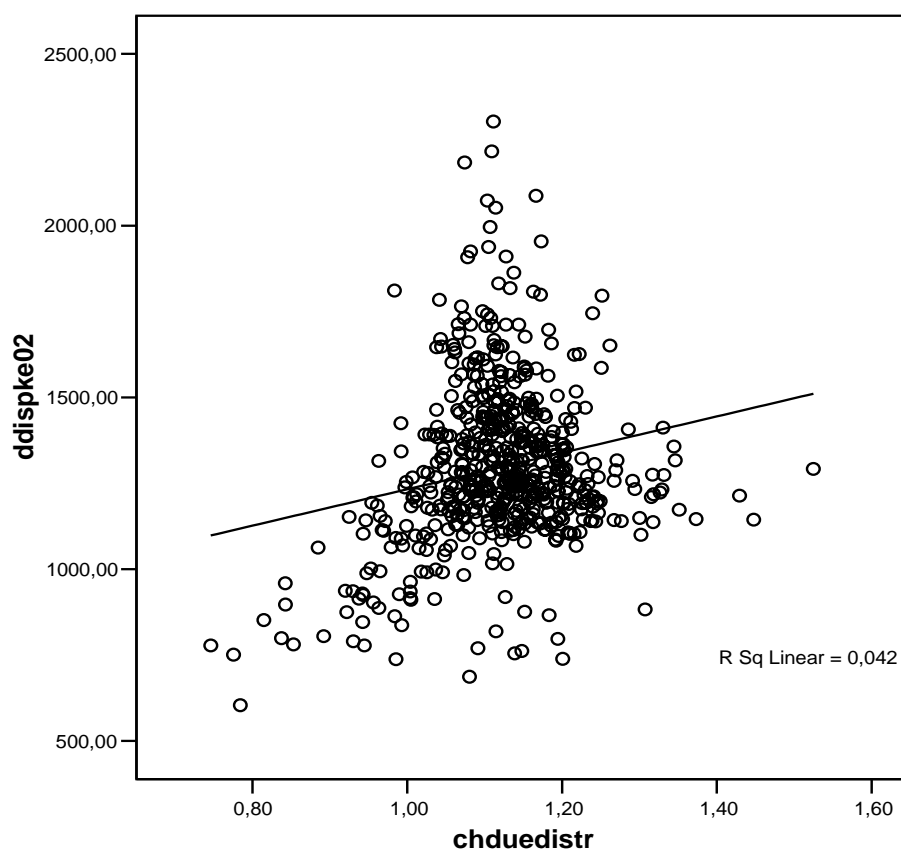
Chduedistr = predicted disposable income from the 2002 model with the 2002 distribution of the independent variables/ predicted disposable income from the 2002 model with the 1990 distribution of the independent variables (Changes due to changes in distribution)
Ddispke02 = Mean disposable income in each neighbourhood in year 2002 ..

Source: Authors calculations from the Social Medicine Database, Centre for Epidemiology at The National Board of Health and Welfare.

Figure 5

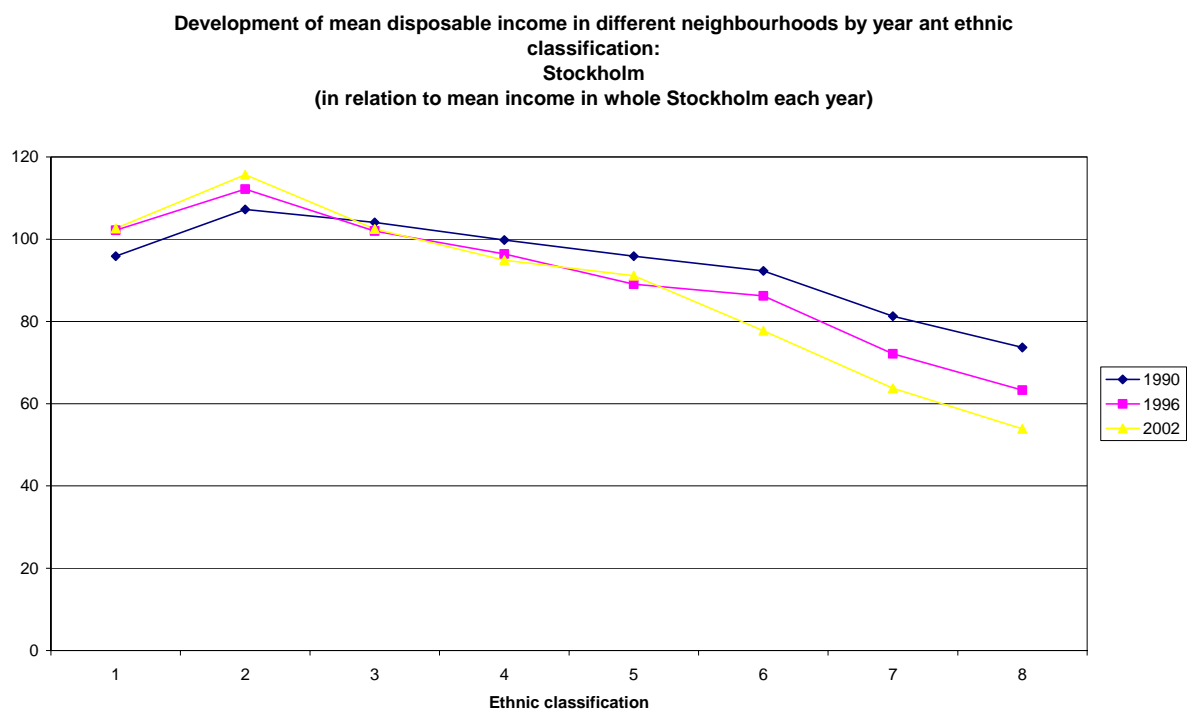Predicted changes in mean child neighbourhood income from 1990 to 2002 due to changes in coefficients in model estimations.
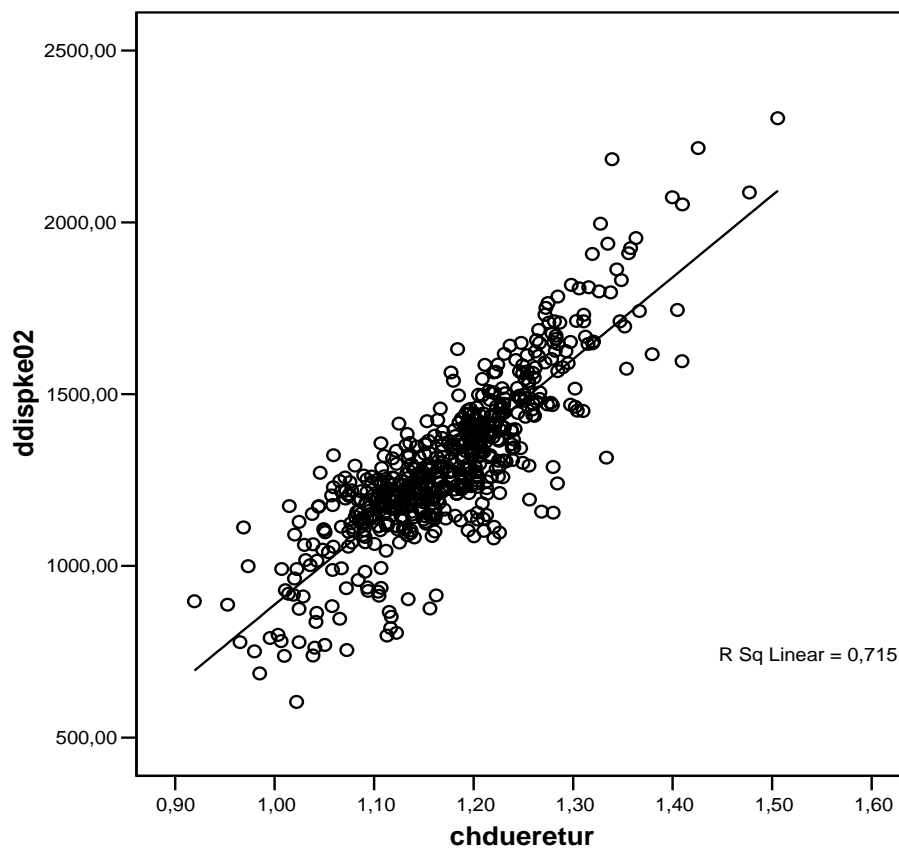
Chdueretur=predicted income from the 2002 model with the 2002 distribution of the independent varaibles/ predicted income from the 1990 model with the 2002 distribution of the independent variables. (changes due to changes in returns)
Ddispke02 = Mean disposable income in each neighbourhood in year 2002 ..
Source: Authors calculations from the Social Medicine Database, Centre for Epidemiology at The National Board of Health and Welfare.

Appendix

Table A1

Mean child income and inequality in the three metropolitan areas combined 1990, 1996, 2002

Year	MLD	Theil	Gini	Mean disposable income 100s SEK in 2000 prices	*Number of observations*
1990	0.1025	0.1014	0.2334	1022	585 946
1996	0.1437	0.1711	0.2761	1058	630 163
2002	0.1741	0.2415	0.2998	1358	651 559

Source: Authors calculations from the Social Medicine Database, Centre for Epidemiology at The National Board of Health and Welfare.

Table A 2 Definition of variables used in Table 2 and Table 7.

Variables:	
Strong labour market attachement	Annual income from work > 128 000 SEK (in constant prices of year 2000)
Neither income from work nor unemployement benefit	Annual income from work= 0 and unemployment benefit =0
Low labour market attachment	Does not belong to neither of the above mentioned categories.
Children with background in:	
Sweden	Two parents born in Sweden
HIC - High Income Countries	Two parents from HIC countries or one Swedish born parent. HIC countries are defined as the member countries of the European Union and the European Economic Area as well as Japan, the countries of Oceania, and the North American countries of the United States and Canada
MLIC – Middle and Low Income countries	Two parents born in all other countries apart from HIC countries and Sweden.

Table A3. Decomposing inequality in child income by clusters of neighbourhoods having different ethnic compositions in the Stockholm, Göteborg and Malmö metropolitan areas 1990, 1996 and 2002.

a) The Stockholm region

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	Mean disposable income 100s SEK in 2000 yrs prices	MLD	Theil	Gini	N	Between group inequality as a percent of total inequality (MLD)	Between group inequality as a percent of total inequality (Theil)
1990 all:	1052	0.1075	0.1049	0.2392	341 780		
After ethnic status							
0	980	0.1247	0.1208	0.2604	1217		
1	1009	0.0984	0.0975	0.2295	38877		
2	1128	0.0982	0.1017	0.2264	119797		
3	1095	0.1066	0.1039	0.2374	62019		
4	1050	0.1004	0.0923	0.2309	29820		
5	1009	0.0990	0.0941	0.2346	39199		
6	971	0.1048	0.0971	0.2400	21857		
7	855	0.1359	0.1234	0.2762	17622		
8	775	0.1347	0.1227	0.2730	11368		
1996 all:	1098	0.1563	0.1858	0.2867	370 272		
After ethnic status							
0	1464	0.4357	0.8902	0.4735	718		
1	1122	0.1549	0.2170	0.2869	51209		
2	1232	0.1573	0.2102	0.2867	127540		
3	1120	0.1288	0.1427	0.2617	67845		
4	1059	0.1239	0.1183	0.2583	34443		
5	978	0.1228	0.1156	0.2596	27508		
6	947	0.1399	0.1261	0.2738	29559		
7	792	0.1750	0.1566	0.3090	17358		
8	695	0.1731	0.1553	0.3088	14093		
2002	1442	0.1957	0.2968	0.3174	386 448		
After ethnic status							
0	1604	0.2535	0.3406	0.3772	522		
1	1480	0.1668	0.2265	0.2986	60638		
2	1668	0.1989	0.3281	0.3219	131593		
3	1478	0.1488	0.1886	0.2769	67284		
4	1369	0.1445	0.1459	0.2733	29270		
5	1314	0.2124	0.5952	0.3235	40260		
6	1121	0.1585	0.1401	0.2866	22619		
7	920	0.1853	0.1636	0.3168	20366		
8	777	0.1944	0.1719	0.3252	13889		
Within group							

		MLD	Theil					
inequality								
1990		0.1037	0.1012					
1996		0.1467	0.1767					
2002		0.1792	0.2820					
Between group inequality								
1990		0.0038	0.0037				3.57%	3.48%
1996		0.0096	0.0089				6.14%	4.80%
2002		0.0164	0.0148				8.38%	4.97%

Note: Ethnic status is defined based on the average rate visible immigrants to the native born population in the region computed and put equal to 1.0. Status 1 means a rate less than 0.25, status 2 a rate 0.25 to 0.49, status 3 a rate 0.50 to 0.79, status 4 a rate 0.80 – 1.24, status 5 a rate 1.25 to 1.99, status 6 a rate 2.0 to 3.99, status 7 a rate 4.00 to 9.99 and status 10 and higher.

The Göteborg region

	Mean disposable income 100s SEK in 2000 yrs prices	MLD	Theil	Gini	N	Between group inequality as a percent of total inequality (MLD)	Between group inequality as a percent of total inequality (Theil)
1990 all:	987	0.0929	0.0948	0.2220	145 286		
After ethnic status							
0	845	0.0825	0.0771	0.2066	1621		
1	994	0.0902	0.1069	0.2154	38825		
2	1010	0.0777	0.0786	0.2036	36624		
3	1026	0.0968	0.0960	0.2251	21356		
4	1005	0.0937	0.0874	0.2250	15347		
5	973	0.0962	0.0916	0.2257	9861		
6	932	0.1105	0.1015	0.2479	10272		
7	888	0.1080	0.0986	0.2468	9266		
8	797	0.1243	0.1150	0.2654	2114		
1996 all:	1010	0.1192	0.1403	0.2538	156 608		
After ethnic status							
0	910	0.0835	0.0816	0.2103	1478		
1	1052	0.1220	0.1655	0.2547	41994		
2	1062	0.1061	0.1412	0.2393	43059		
3	1061	0.1099	0.1230	0.2463	23472		
4	996	0.1018	0.09920	0.2386	12915		
5	956	0.1134	0.1012	0.2455	11948		
6	899	0.1251	0.1156	0.2661	9487		
7	833	0.1269	0.1194	0.2712	4726		
8	713	0.1481	0.1365	0.2901	7525		
2002	1253	0.1267	0.1344	0.2590	160 539		
After ethnic status							
0	1155	0.0895	0.0882	0.2247	963		
1	1329	0.1135	0.1364	0.2484	46373		
2	1345	0.1092	0.1183	0.2434	47924		
3	1284	0.1132	0.1192	0.2444	20690		
4	1236	0.1259	0.1456	0.2556	13121		
5	1154	0.1181	0.1048	0.2485	8984		

	Mean disposable income	MLD	Theil	Gini	N	Between group inequality as a percent of total inequality (MLD)	Between group inequality as a percent of total inequality (Theil)
6	1056	0.1347	0.1206	0.2693	9693		
7	929	0.1472	0.1344	0.2871	5439		
8	759	0.1643	0.1476	0.3021	7351		
Within group inequality							
1990		0.0918	0.0938				
1996		0.1147	0.1362				
2002		0.1181	0.1266				
Between group inequality							
1990		0.0011	0.0011			1.18%	1.12%
1996		0.0045	0.0041			3.73%	2.94%
2002		0.0086	0.0077			6.81%	5.75%

Note: Ethnic status is defined based on the average rate visible immigrants to the native born population in the region computed and put equal to 1.0. Status 1 means a rate less than 0.25, status 2 a rate 0.25 to 0.49, status 3 a rate 0.50 to 0.79, status 4 a rate 0.80 – 1.24, status 5 a rate 1.25 to 1.99, status 6 a rate 2.0 to 3.99, status 7 a rate 4.00 to 9.99 and status 10 and higher.

c) The Malmö region

	Mean disposable income 100s SEK in 2000 yrs prices	MLD	Theil	Gini	N	Between group inequality as a percent of total inequality (MLD)	Between group inequality as a percent of total inequality (Theil)
1990 all:	974	0.09609	0.09497	0.2231	98 880		
After ethnic status							
0	930	0.1165	0.1094	0.2371	1650		
1	990	0.0803	0.08706	0.2049	30582		
2	1026	0.0866	0.0904	0.2129	17093		
3	978	0.0816	0.08258	0.2095	14156		
4	1008	0.1060	0.10676	0.2329	10191		
5	946	0.0995	0.09276	0.2341	10496		
6	921	0.1253	0.10916	0.2527	9928		
7	815	0.1819	0.13067	0.2696	1750		
8	767	0.1188	0.10776	0.2544	3034		
1996 all:	988	0.12935	0.15381	0.2625	103 283		
After ethnic status							
0	997	0.1330	0.15233	0.2580	1603		
1	1046	0.1043	0.11746	0.2375	33372		
2	1105	0.1503	0.26552	0.2780	17741		
3	975	0.1030	0.10365	0.2383	13865		
4	1027	0.1276	0.13410	0.2578	9574		
5	923	0.1131	0.10655	0.2506	9886		
6	847	0.1429	0.12701	0.2793	11708		
7	763	0.1406	0.13291	0.2806	2155		
8	573	0.1262	0.12758	0.2692	3377		
2002	1205	0.1487	0.14772	0.2745	104 572		
After ethnic							

status							
0	1222	0.1145	0.10773	0.2449	1271		
1	1334	0.1173	0.13054	0.2486	36602		
2	1354	0.1346	0.15729	0.2608	16442		
3	1208	0.1218	0.12058	0.2504	15732		
4	1221	0.1429	0.12751	0.2665	7332		
5	1098	0.1441	0.12182	0.2691	9806		
6	933	0.1719	0.14604	0.2992	9680		
7	845	0.1757	0.14810	0.2998	4201		
8	591	0.1514	0.14195	0.2922	3506		
Within group inequality							
1990		0.0944	0.09332				
1996		0.1213	0.14661				
2002		0.1335	0.13432				
Between group inequality							
1990		0.0016	0.00155			1.70%	1.63%
1996		0.0079	0.00720			6.14%	4.68%
2002		0.0152	0.01341			10.23%	9.08%

Source: Authors calculations from the Social Medicine Database, Centre for Epidemiology at The National Board of Health and Welfare.

Note: Ethnic status is defined based on the average rate visible immigrants to the native born population in the region computed and put equal to 1.0. Status 1 means a rate less than 0.25, status 2 a rate 0.25 to 0.49, status 3 a rate 0.50 to 0.79, status 4 a rate 0.80 – 1.24, status 5 a rate 1.25 to 1.99, status 6 a rate 2.0 to 3.99, status 7 a rate 4.00 to 9.99 and status 10 and higher.