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ABSTRACT

Does Segregation Reduce Socio-Spatial Mobility? Evidence from Four European Countries with Different Inequality and Segregation Contexts

The neighbourhoods in which people live reflects their social class and preferences, so studying socio-spatial mobility between neighbourhoods gives insight in the openness of spatial class structures of societies and in the ability of people to leave disadvantaged neighbourhoods. We study the extent to which people move between different types of neighbourhoods by socio-economic status in different inequality and segregation contexts in four European countries: Sweden, the Netherlands, the United Kingdom, and Estonia. The study is based on population registers and census data for the 2001–2011 period. For the UK, which has long had high levels of social inequalities and high levels of socio-economic segregation, we find that levels of mobility between neighbourhood types are low and opportunities to move to more socio-economically advantaged neighbourhoods are modest. In Estonia, which used to be one or the most equal and least segregated countries in Europe and now is one of the most liberal and market oriented countries, we find high levels of mobility, but these reproduce segregation patterns and it is difficult to move to better neighbourhoods for those in the most deprived neighbourhoods. In the Netherlands and Sweden, where social inequalities are the smallest, it is easiest to move from the most deprived to less deprived neighbourhoods. To conclusion, the combination of high levels of social inequalities and high levels of spatial segregation tend to lead to a vicious circle of segregation for low income groups, where it is difficult to undertake both upward social mobility and upward spatial mobility.

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Introduction

European cities are getting increasingly socially unequal and residentially segregated (Tammaru et al. 2016). Although segregation *per se* is not necessarily a problem, it can potentially lead to a range of social problems. Empirical research shows that especially for low-income groups, often with an immigrant background, residential isolation tends to have negative effects when it comes to, for example, education and employment outcomes (Nieuwenhuis & Hooimeijer 2016; Nieuwenhuis et al. 2017; van Ham et al. 2012). In other words, through negative neighbourhood effects, high levels of segregation may affect the opportunities people have in life, and this may lead to a "vicious circle of segregation" for low income individuals, that often operates over generations (Tammaru et al. 2017). The spatial concentration of low-income groups in neighbourhoods with affordable housing arises because of their limited financial resources which restricts options in the housing market. Since most children attend the nearest educational institution to their home, residential segregation gets reproduced in school segregation. School segregation can lead to labour market segregation that, in turn, translates into different incomes and affects where people live. These socio-spatial structures are then inherited from one generation to the next (Hedman et al. 2015). Hence, housing and segregation become part of the overall structure of social inequalities.

When poverty and living in a deprived neighbourhood and their consequences are seen within a life course framework (de Vuijst et al. 2016), the important question arises whether these phenomena are temporary or structural in an individual life. High levels of social inequalities and socio-economic segregation in a country may become an obstacle for upward social and spatial mobility (Nieuwenhuis et al. 2016), and as a consequence, the existing social and spatial structures may get more rigid and petrified over time. It can be expected that the ability of people to move from a deprived neighbourhood to a more affluent neighbourhood is related to the overall opportunities for socio-spatial mobility in a country. If this is the case, and if living in a deprived neighbourhood negatively affects socio-spatial mobility, then a vicious circle of deprivation may occur.

This paper investigates the extent to which people are able to move to a better neighbourhood in different countries representing different inequality and segregation contexts. While comparative research on segregation has started to emerge (Arbaci 2007; Maloutas & Fuijata 2012; Tammaru et al. 2016), there is hardly any comparative research on socio-spatial mobility. One reason for a lack of comparative studies is the high demand on data. Research on segregation can rely on cross-sectional data, but socio-spatial mobility data requires individual-level longitudinal data where individuals can be followed between at least two points in time. This paper uses longitudinal census and register data from Estonia, the Netherlands, Sweden and the UK, to answer the following research questions: To what extent are there between-country differences in the extent to which people move between neighbourhoods with different deprivation levels? And to what extent are there between-country differences in people's ability to move from the most deprived to the least deprived neighbourhoods? And finally, can country-specific characteristics — most notably levels of

inequality and residential segregation — help us to better understand the between-country differences in the spatial mobility patterns across neighbourhoods with different levels of deprivation?

The choice to compare Estonia, Sweden, the Netherlands and the UK is pragmatic, because of data availability, but also because they represent very different social inequality and residential segregation contexts. Estonia used to have one of the lowest levels of social inequalities and socio-economic segregation when it was part of the Soviet Union (Marcinczak et al. 2015). During the large-scale social transformations in Eastern Europe after the fall of the Berlin Wall in 1989, Estonia has become one of the most unequal and residentially segregated countries in Europe (Musterd et al. 2017). In the UK social inequalities and residential segregation have been high for decades (Manley & Johnston 2014). Social inequalities in Sweden and in the Netherlands are low compared to Estonia and the UK, although especially in Sweden the level of inequality and segregation is rising sharply (Andersson & Kährik 2016; Musterd & van Gent 2016). The four countries also have very different welfare state models, where social security is lowest in Estonia, followed by the UK, the Netherlands and Sweden. Finding comparable data for the four countries was a challenge. For the Netherlands and Sweden we employed individually-linked population register data on social benefits, while for the UK and Estonia we used individually-linked census data on unemployment for the years 2001 and 2011.

Residential segregation and socio-spatial mobility

Residential segregation by socio-economic groups is largely a result of selective residential mobility of certain groups into and out of different types of neighbourhoods. These residential mobility patterns are a function of various factors that range from individual resources and preferences through to macro-level opportunities and constraints. One of the first frameworks to understand evolving patterns of segregation and underlying flows of residential mobility was provided by the Chicago School (Park et al. 1925). Their explanatory framework refers to the 'natural forces' that adapt people to their environment and leads to the sorting of different social groups into different parts of the city. This framework was developed further through the factorial ecological approach (Berry & Kasarda 1977) and GIS-based segregation studies and advanced spatial modelling (Wong 2003), demonstrating that residential segregation is largely a functioning of people sorting into neighbourhoods based on the family career, racial/ethnic origin and social status. Higher social groups are usually driving the process of residential sorting as they strive to translate their higher purchasing power into living in the most attractive houses and neighbourhoods, leaving less desirable houses and neighbourhoods for lower social status groups. Segregation levels vary significantly between countries, which means that the ability of high-income groups to translate economic success into residential outcomes varies from country to country (Musterd et al. 2017). These between country differences can largely be explained by national differences in welfare regimes, housing policies and spatial policies and planning interventions that shape either directly or indirectly

social inequalities and the spatial (im)mobility of social groups (Maloutas & Fuijta 2012; Musterd & Ostendorf 1998; Tammaru et al. 2017).

Both social mobility (mobility between occupational classes) and socio-spatial mobility (moves between neighbourhood types) relate to the level of social inequalities in a country (Musterd & Ostendorf 1998). In countries with high levels of social inequality there will be a larger (income) gap between the top and the bottom socio-economic status (SES) neighbourhoods compared to countries with a low level of inequality. Countries that have more elements of the social democratic welfare regime, such as Sweden, tend to be characterized by lower levels of social inequalities (Gini index of 25, Eurostat 2017) while countries that have more elements of the liberal welfare regime, such as UK (Gini index of 32), tend to be characterized by higher levels of social inequalities. Corporatist countries and countries with a mix of elements from different welfare regimes such as the Netherlands (Gini of 27) take an in-between position. Estonia (Gini is 35) is an interesting case because it has moved from the group with the lowest level of social inequalities to the group with the highest level of social inequalities in Europe. When plotting social inequalities and intergenerational social immobility in what is known as the Great Gatsby Curve (Krueger 2012), we find that in the UK and Estonia there is relatively high inequality and high social immobility, while in Sweden and the Netherlands, social inequality is lower, and social immobility is also lower (Figure 1). So in Sweden and the Netherlands people are more likely to be upwardly socially mobile over generations.

-- Figure 1 about here –

When social inequalities and social (im)mobility are so strongly related to each other, then there are reasons to expect that a similar relationship exists between the level of residential segregation and the extent of upward socio-spatial mobility. With other words, it is likely to be easier to move to a better neighbourhood when the level of residential segregation in a city is low, and it is more difficult to move to a better neighbourhood when residential segregation is high. So in Figure 2 we suggest that low levels of inequality and segregation are associated with a higher likelihood of socio-spatial mobility, simply because the "social distances" between neighbourhoods are relatively small. And high levels of social inequality and segregation are likely to be associated with low levels of socio-spatial mobility.

-- Figure 2 about here --

The costs of housing are likely to play an important role in this relation between social segregation and socio-spatial mobility. If increasing numbers of high-income households concentrate to certain areas of the city, the prices of housing in these places get out of the reach of lower-income people. These are processes related to gentrification and some even use the term colonization for characterizing the socio-economic upgrade that is going on in many inner city neighbourhoods (Atkinson & Bridge 2005; Leal & Sorando 2016). Like with social mobility, there is a strong intergenerational dimension in socio-spatial mobility as social disadvantages tend to be transmitted from parents to children, both (a) directly as

parental wealth is important for children in entering the housing market or (b) indirectly, via the transmission of context as children end up living in similar neighbourhoods as their parents and are thereby subject to similar contextual influences (d'Addio 2007; Hedman et al. 2015; Sharkey 2013).

The direct intergenerational transmission of residential advantage occurs as children leave the parental home. Even for those from more affluent neighbourhoods, the socio-economic status of their independent neighbourhood drops compared to the parental neighbourhood when leaving the parental home, as people go to higher education or get their first jobs. Some years after graduation, parental wealth differences start to shape the residential careers of young people (van Ham et al. 2014). For young people from more affluent families, the 'Bank of Mum and Dad' often helps them to co-financing the start of their housing career. In the UK, about 25 per cent of homebuyers rely on parental help (The Guardian 2017). What is more, such inter-generational wealth transmission elevates housing prices with the effect that increasing segments of housing are out of the reach of others through the weakening of the link between house prices and salaries (Marcinczak et al. 2017). The indirect intergenerational mechanism relates to socialization in different residential neighbourhoods during childhood.

Higher levels of social inequalities and socio-economic segregation tend to come along with the retrenchment of the welfare state and the promotion of home-ownership that characterize changes on the housing markets in most European countries (Tammaru et al. 2016). The stronger the role of markets, the easier it is for the top social groups to translate economic success into better housing in more attractive neighbourhoods. The effect of the market is especially important in countries with more liberal welfare regimes. It can be assumed that it becomes more difficult to move to a better neighbourhood as market mechanism become more important in the housing sector, driving up levels of inequality and segregation. The residential mobility of high-income groups leads to the residualization of low cost (social housing) for the low-income groups (Kleinhans & van Ham 2013). The modernist housing estates built in the 1960s through the 1980s to meet the then high housing demand in rapidly growing cities, have become areas where lower-income groups tend to concentrate (Marcinczak et al. 2016). Paris is a good example in this regard where modernist housing estates have become virtually synonymous with the notion of "deprived neighbourhoods" since the 1980s (Lelévrier & Melic 2018). However, as the market mechanisms operate over a longer period of time, the already high levels of residential segregation can start to hinder upward socio-spatial mobility for reasons discussed above; it becomes more difficult for lower-income groups to move vertically into neighbourhoods of higher socio-economic status.

To conclude, higher levels of social inequalities tend to reduce social mobility and, hence, we hypothesise that higher levels of residential segregation also reduces socio-spatial mobility between neighbourhood types; in other words, that the Great Gatsby Curve characterizes not only social but also socio-spatial processes. With increasing levels of inequality and social segregation the level of upward socio-spatial mobility is expected to drop because of the larger "social distance" within the neighbourhood social hierarchy. At times of growing inequalities and increasing segregation, residential mobility sorts high-income and low-

income groups into different residential neighbourhoods. In longer periods of high inequality/high segregation, it becomes more difficult to be upward socio-spatially mobile, e.g., to move to a better neighbourhood. We expect that in Sweden and the Netherlands it is easier to move from deprived neighbourhoods to less deprived neighbourhoods than in the UK and Estonia. In both Sweden and the Netherlands social inequalities are low in comparative perspective, while segregation levels have grown in Sweden but not in the Netherlands.

Data and methods

Data for this study came from national registers and censuses. Because for this study it was crucial that we could measure moves of individuals between neighbourhood types, we needed longitudinal data. For the Netherlands, we used population register data from the Statistics Netherlands' System of Social Statistical Datasets (SSD). The SSD is an extensive system of longitudinal datasets, combining, amongst other, population, tax, and housing registers, covering the full population of the Netherlands since 1999. Geographic information is available on a 100x100m and 500x500m basis (Bakker et al. 2014). In this study, we used 500x500m that is consistent with the average neighbourhood sizes of about 1,000 inhabitants.

The Swedish data source is also a population register, derived from Statistics Sweden and compiled into the database GeoSweden owned by the Institute for Housing and Urban Studies. The database contains annual demographic, geographic, socio-economic and housing information on the entire Swedish population since 1990. The geographic information consists on coordinates on a 100x100m basis. These were merged into 500x500m grids for the purpose of the current study. Using only areas with a minimum of five in-sample inhabitants (see later in this section), the neighbourhood population in these areas varied from five to 5,465 with a mean of 61.19 (due to many sparsely populated areas in the country).

The British Data, covering 2001 and 2011 was derived from the UK Census. The UK Census is held every 10 years and access to individual level data is restricted with general release providing cross sectional data within aggregated areas. For the purpose of this study we used areas known as Lower Super Output Areas (LSOAs). These areas are frequently used by the UK Government as functional neighbourhoods for policy delivery and assessment. Critically, for the analysis presented the LSOAs have remained largely consistent[1] between the two census periods, allowing the comparison of population characteristics without the concern of change areal boundaries influencing results. Because we were interested in following individuals over time rather than simple comparable totals for the LSOAs the data used are specially derived from the Office for National Statistics Longitudinal Sample (ONS-LS), a 1% of the UK population longitudinally linked, in a tabulation specially commissioned from the ONS.

Data for Estonia came from the two last censuses of 2000 and 2011, and it included the full population of Estonia. Statistics Estonia has linked the 2000 and 2011 censuses by personal

identification code. The database included the full set of demographic, geographic, socio-economic, and housing information as regularly collected in censuses, as well as the smallest planning units of the country of approximately 1,000 people on average.

For each country we selected all individuals not living at home with their parents in 2001, who were not institutionalised in both 2001 and 2011, and who had a valid address in the data in both years. We selected both movers and non-movers, because immobility also reflects differences in country's spatial mobility patterns. For all four countries we present the following information: the neighbourhood in which individuals lived on 1 January 2001 and on 1 January 2011, and a measure for the level of neighbourhood deprivation of the 2001 and 2011 neighbourhoods. Because of the differences in data collection between the four countries, there was no simple way to construct comparable data. To make the data as comparable as possible, we identified the most comparable measures of neighbourhood deprivation in each of the national datasets (see Table 1).

-- Table 1 about here --

In order to compare socio-spatial mobility patterns between the four countries, we created four 10x10 matrices for individuals combining deprivation in the neighbourhood of origin for 2001 with deprivation in the neighbourhood of destination in 2011 (see Appendix A; Tables A1-A4). Although deprivation is a continuous measure we categorised it into deciles measuring the proportion of individuals receiving unemployment benefits or social security benefits (the Netherlands and Sweden) or the proportion of individuals registered as unemployed (the UK and Estonia). The deciles of neighbourhood deprivation were calculated for the full population, excluding those not at risk of becoming unemployed, that is, those individuals that were older than 65, children living at home, and institutionalised individuals.

Results

By plotting a mobility curve in Figure 3, we first examine the share people remaining in the same decile of neighbourhood deprivation over the 2001-2011 period in the four countries. The lines show the relative stickiness of the population in neighbourhood deprivation deciles. Decile 1 are the least deprived neighbourhoods and decile 10 are the most deprived neighbourhoods. The 'U-shape' of the mobility curve is similar in all four countries; people who live in the least deprived and most deprived neighbourhoods are the most likely to stay in a similar neighbourhood than people living in more socially mixed neighbourhoods. This outcome can have two explanations. First, there may be a methodological explanation because there are both floor and ceiling effects and, therefore, people living in the most and least deprived neighbourhoods cannot move to neighbourhoods that are even more or less deprived, respectively. The second explanation is more substantial. Those with low incomes have less resources to move upward, while more affluent people are likely to stay where they are because they are satisfied with their living conditions, reducing their willingness to move.

People living in socio-economically mixed areas are more likely to move either downward or upward within the neighbourhood hierarchy.

-- Figure 3 about here --

If the substantial interpretation has relevance, we expect to find differences in socio-spatial mobility between our case study countries that would reflect their social inequalities and residential segregation contexts. The findings are as expected. Most importantly, there is a stark contrast in socio-spatial mobility between the UK on the one hand and Estonia, Sweden and the Netherlands on the other hand. The mobility curve across neighbourhood deprivation levels is much more flat in UK than in the other three countries, i.e. people living in the UK are more "stuck" in their neighbourhood deprivation type than people living in the other three countries. The contrast between UK and the other three counties becomes even more pronounced when examining how many people live in an area with the same decile of deprivation in 2001 and 2011; 60–70% of people have not experienced any change in neighbourhood type in the UK, while only 10–50% of people have been socio-spatially immobile in Estonia, Sweden and the Netherlands.

Most moves take place between neighbouring decile categories, that is, people tend to move to neighbourhoods that are either one decile 'up' or 'down' compared with the origin neighbourhood. In other words, spatial mobility generally does not bring along a stark change in the social context where people live, especially when people who live in a neighbourhood that was on the upper boundary of decile x move to a neighbourhood that is on the lower boundary of decile x+1. We are interested in the more substantial shifts in the social context of spatially mobile people and we will therefore aggregate people who live in the neighbourhood with the same, one lower, or one higher decile of deprivation in 2001 and 2011. As a result we will now capture less residential mobility. Figure 4 shows that the difference between countries are now less pronounced, still indicating that there is more socio-spatial stickiness in the UK, compared to Estonia, Sweden and the Netherlands. More in-depth analysis of our data shows that only 10–20% of the change of neighbourhood deprivation context is because of neighbourhoods themselves change deprivation decile due to neighbourhood social upgrading or downgrading. This implies that most of the changes we capture in our analyses is due to people moving between neighbourhoods. Still, the most common mobility pattern relates to moving to a neighbourhood with a similar socio-economic profile as the neighbourhood of origin. Comparing Figure 4 to Figure 3 shows that about 50% of the socio-spatial mobility in all four countries is mobility between adjacent deciles.

-- Figure 4 about here --

The country ranking in Figure 4 is similar to Figure 3; people in the UK are the least mobile and people in Estonia move most between neighbourhood types. The pathways for Sweden and the Netherlands cross, indicating that, in the Netherlands, the people living in the less deprived neighbourhoods are socio-spatially more mobile compared to Sweden, but in Sweden, people living in the most deprived neighbourhoods are socio-spatially more mobile

than in the Netherlands. Furthermore, the mobility curve in Sweden is not 'U-shaped' any more once we aggregated moves to neighbouring deprivation decile categories, indicating stronger residential stability in the socially mixed neighbourhoods than in the other three countries.

The spatial isolation of low-income groups is often seen as the most negative side of high levels of social segregation. Hence we are particularly interested in their ability to move out from the most deprived neighbourhoods into better neighbourhoods (i.e., upward socio-spatial mobility). The differences between countries in the percentage of people that move to less deprived neighbourhoods by at least two deciles (Figure 5) and that move to more deprived neighbourhoods by at least two deciles (Figure 6) shows another part of the story. Figure 5 shows that both in the UK and in Estonia, people who live in less deprived neighbourhoods (lower deciles) in 2001 more often move to less deprived neighbourhoods in 2011 compared to people who live in more deprived neighbourhoods (higher deciles) in 2001. In other words, higher-income groups get even more concentrated in less deprived neighbourhoods. In contract, in Sweden and the Netherlands the pattern is the opposite. Here people who live in more deprived neighbourhoods in 2001 more often move to less deprived neighbourhoods in 2011 compared to people who live in less deprived neighbourhoods in 2001. In other words, in Sweden and the Netherlands socio-spatial mobility reproduces segregation less than is the case in Estonia and the UK. Figure 6 complements this picture and shows that in the UK and in Estonia, people who live in more affluent neighbourhoods in 2001 (lower deciles) less often move to more deprived neighbourhoods compared to people who live in more deprived neighbourhoods in 2001. And again, Sweden and the Netherlands show the opposite picture, where people who live in less deprived neighbourhoods in 2001 more often move to more deprived neighbourhoods in 2011 compared to people who already live in more deprived neighbourhoods in 2001.

-- Figure 5 about here --

-- Figure 6 about here --

Conclusions and discussion

Our main findings show that people in the UK are the most socio-spatially immobile in terms of moving between neighbourhood types, and people in Estonia are the most mobile. The intensity of mobility between neighbourhoods of different deprivation levels in Sweden and Netherlands falls in-between. Furthermore, it is the easiest to move out from the most disadvantaged neighbourhoods in the Netherlands and especially in Sweden.

In the UK, a liberal welfare regime has existed for a long period of time and the associated high social inequalities and high residential segregation context has created rigid socio-spatial structures; not only social mobility but also socio-spatial mobility is low due to the large social distance between neighbourhood types. Estonia used to be very equal and very

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modestly segregated under central planning in Soviet times, but adopted a very liberal welfare regime with high levels of homeownership after regaining independence in 1991. This resulted in the rapid growth of social inequalities in the 1990s. As higher-income groups started to translate their economic success into better living conditions, socio-spatial mobility increased in the 2000s. As a consequence, Estonia shifted from the position of one of the least socio-economically segregated countries to one of the most socio-economically segregated countries in Europe in the 2000s. The Netherlands and Sweden, in comparative perspective, still represent strong welfare regimes that allow not only a relatively easy upward social mobility but also relatively easy upward socio-spatial mobility.

Higher social inequalities, which are characteristic for countries with liberal welfare regimes, elevate levels of socio-economic segregation (Musterd & Ostendorf 1998). The increased socio-spatial mobility links the growth of social inequalities with the growth of segregation levels; high-income groups sort into more affluent neighbourhoods through the process of upward socio-spatial mobility, and poor people sort into more deprived neighbourhoods through the process of downward socio-spatial mobility. Hence, despite the fact that both Estonia and UK represent similar welfare regimes with strong liberal elements, such welfare regimes have been in place for only a short period of time in Estonia and we can see an intense sorting of high-income groups and low-income groups into different neighbourhoods, bringing along rapidly increasing segregation levels. The liberal welfare regime has a much longer history in the UK and both the social and spatial structures have petrified; social inequalities are high and levels of residential segregation are high, too. Social and socio-spatial mobility is difficult in the UK because of the distance needed to be covered in order to change ones social or socio-spatial position (Figure 2). It is easier to undertake upward socio-spatial mobility in the more equal counties of Sweden and the Netherlands.

-- Figure 7 about here --

To conclude, our findings suggest that higher levels of social inequalities and a stronger role of markets lead to an environment where different social groups increasingly get settled in different neighbourhoods. In this context spatial mobility generates higher levels of segregation and, once established, higher levels of segregation reduce, *ceteris paribus,* the spatial mobility between neighbourhood types (Figure 7). The Great Gatsby Curve characterizes thus not only social, but also spatial processes since high levels of residential segregation and low levels of socio-spatial mobility seem to be related to each other. High levels of social inequality and residential segregation seem to reduce socio-spatial mobility. However, the Great Gatsby Curve only partially characterizes mobility-inequalities relations from the point in time when social inequalities are already high. By comparing Estonia and the UK, we have shown that in a longer time perspective a cycle of changes takes place: growing inequalities and segregation levels come along at first with *increased* spatial mobility, followed by *decreased* spatial mobility at later stages of the cycle when inequality and segregation levels are high. Hence for understanding the complex interplay between social inequalities, social mobility, residential segregation and socio-spatial mobility, a long-term time-frame of several decades or even generations is needed.

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Notes

Approximately 97% of all LSOAs remained consistent. Those that have change have been excluded from the analysis to keep the consistency of areas. In practice, LSOAs were changed where substantial population change had occurred rendering the previous iterations of the units unsuitable see Cockings et al., 2011.

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Tables and Figures

Table 1. Comparison of measures and data between the four countries.

	the Netherlands	Sweden	United Kingdom	Estonia
Neighbourhood deprivation	% individuals on social security benefits	% individuals on social security benefits	% unemployed individuals	% unemployed individuals
Neighbourhood delineation	500x500 meter grids	500x500 meter grids	Lower Layer Super Output Areas (LSOAs)	Basic planning units
Period	2001-2011	2001-2011	2001-2011	2000-2011
Data source	Population register	Population register	Census; Longitudinal Study for England and Wales	Census; Linked 2000-2011 censuses database
Research population size	9,464,704	4,816,034	313,750	468,381
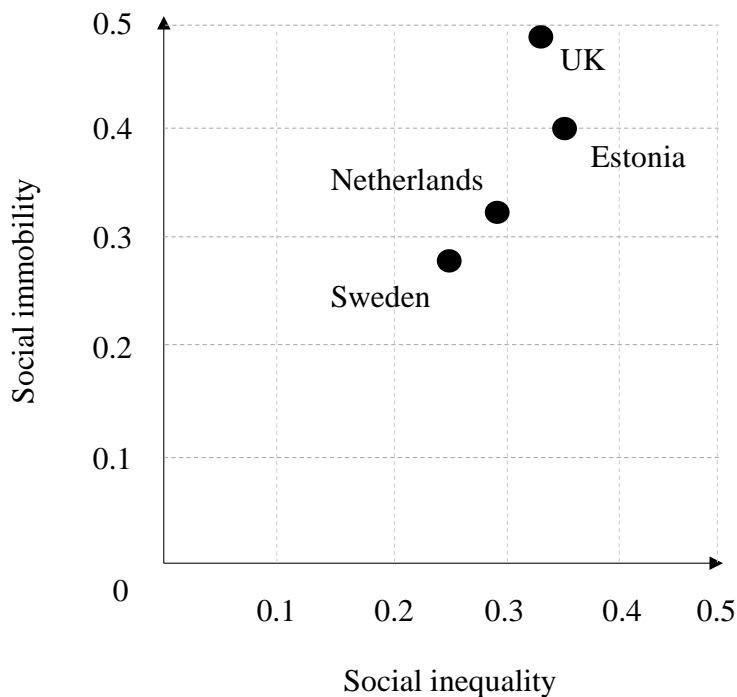
Figure 1. Social inequality (Gini index) and intergenerational social immobility (Income elasticity) in the case study countries.
Sources:
http://www.businessinsider.com/intergenerational-earnings-elasticity-2013-12
(Chauvel & Hartung 2006)

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Figure 2. The relationship between social segregation and socio-spatial mobility.
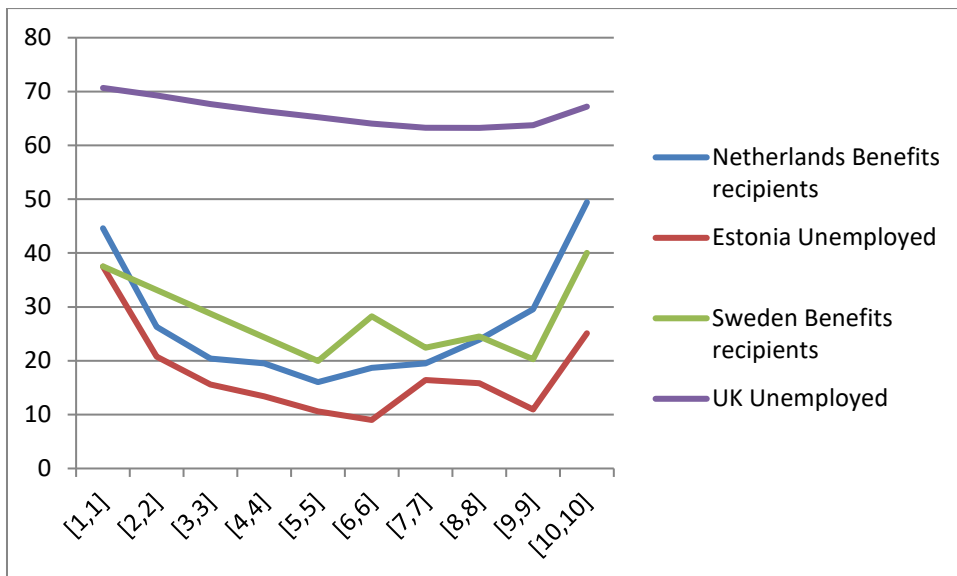
Figure 3. Percentage of individuals that live in an area within the same decile of deprivation in 2001 and 2011. The notation [X,Y] means: X = decile in 2001, Y = decile in 2011. 1 = the least deprived decile; 10 = the most deprived decile.

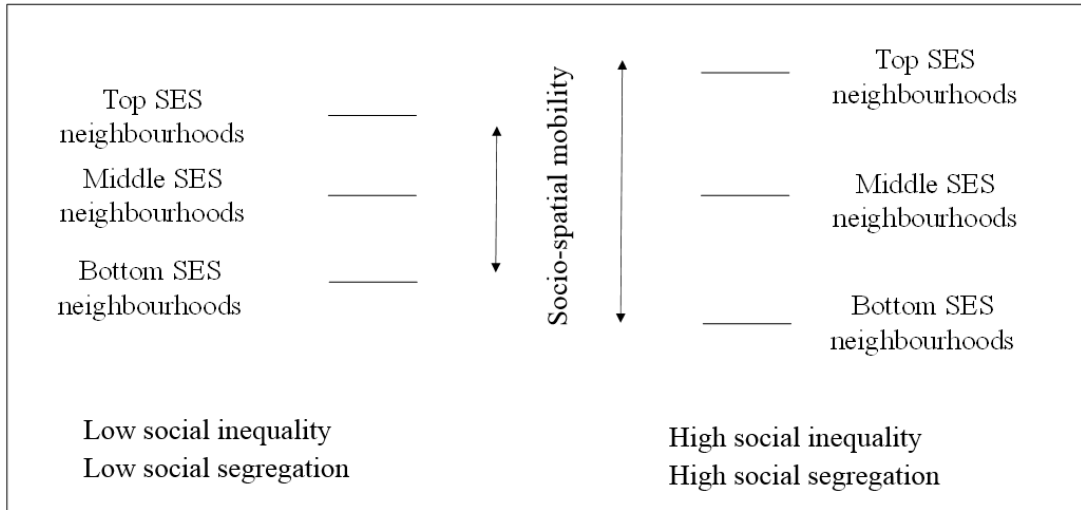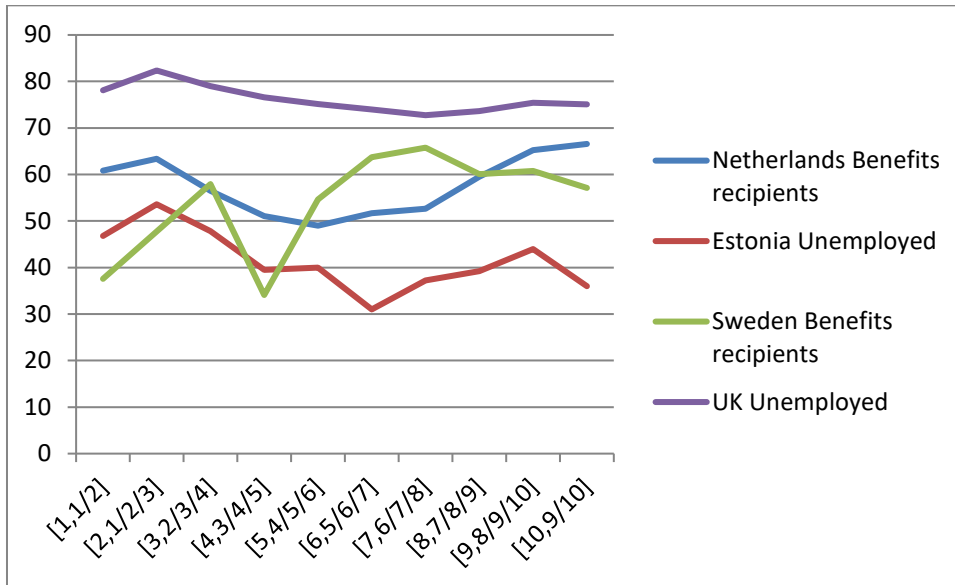Figure 4. Percentage of individuals that live in an area within the same, one lower, or one higher decile of deprivation in 2001 and 2011. The notation [X,Y] means: X = decile in 2001, Y = decile in 2011. 1 = the least deprived decile; 10 = the most deprived decile.

Figure 5. The percentage of moving individuals by country and origin decile who **move to less deprived neighbourhoods** by at least two deciles between 2001 and 2011. 1 = the least deprived decile; 10 = the most deprived decile.

Figure 6. The percentage of moving individuals by country and origin decile who **move to more deprived neighbourhoods** by at least two deciles between 2001 and 2011. 1 = the least deprived decile; 10 = the most deprived decile.

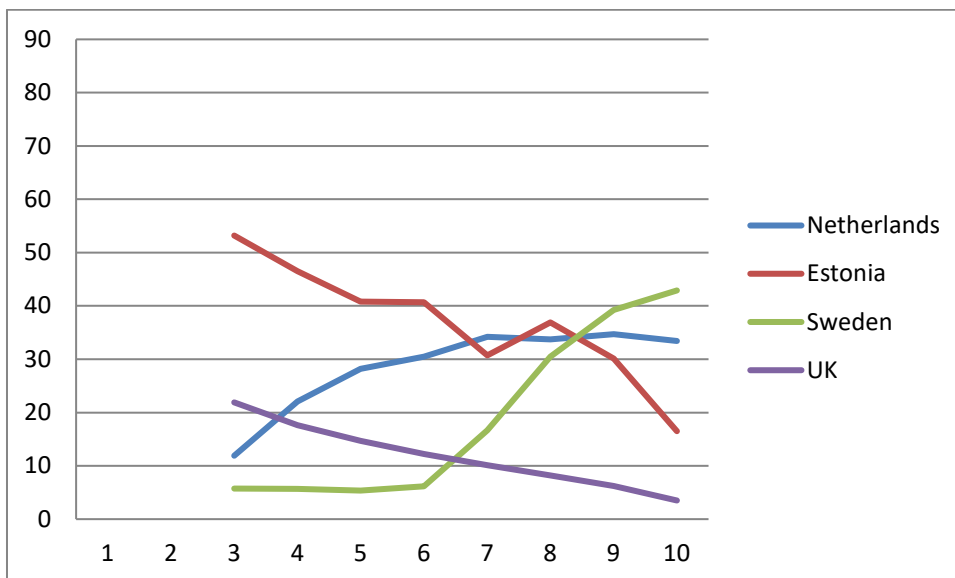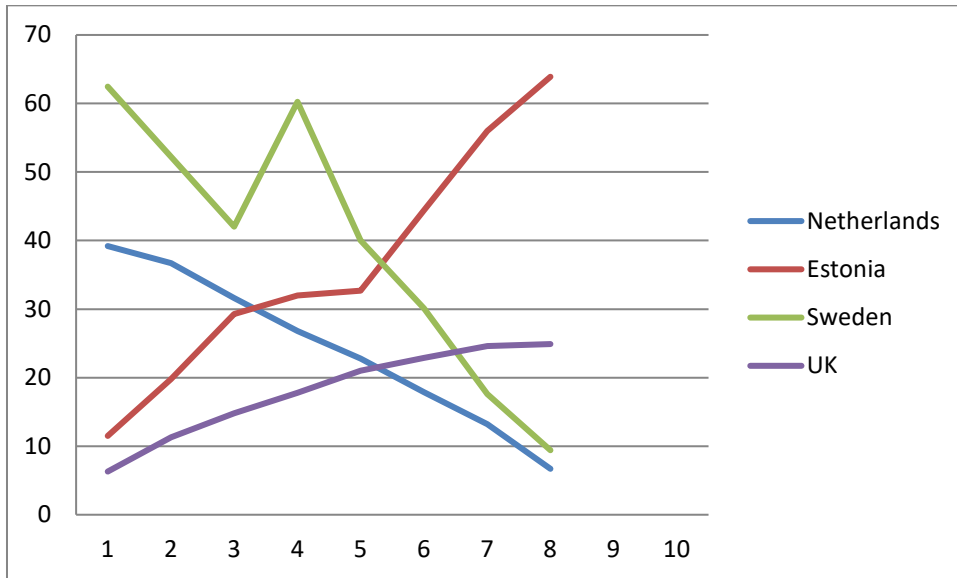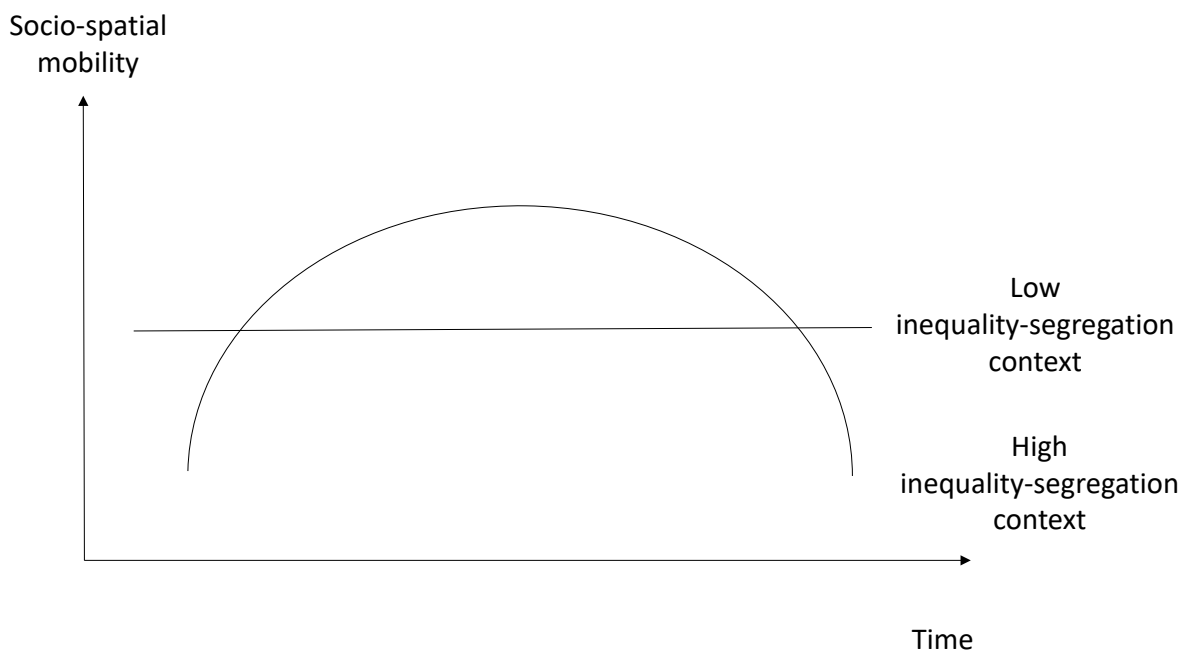Figure 7. Trajectories of socio-spatial mobility under different social inequality-residential segregation contexts.

Appendix A

Tables A1 through A4 below show the 10x10 matrices on which the figures in this paper are based. All tables show the deprivation level (in deciles) of the neighbourhood of origin in 2001 in the rows, and the deprivation level of the destination neighbourhood in 2011 in the columns. Decile 1 are the least deprived neighbourhoods and decile 10 the most deprived neighbourhoods.

Table A1. Percentages of individuals who live in the nth decile of deprivation in 2001 and the nth decile of deprivation in 2011. The Netherlands.

Decile of deprivation 2001	Decile of deprivation 2011										
	1	2	3	4	5	6	7	8	9	10	Total
1	44.58	16.25	10.56	7.41	5.50	4.56	3.70	2.86	2.56	2.01	100
2	17.52	26.28	19.55	13.61	9.13	5.47	3.37	2.33	1.69	1.05	100
3	11.92	19.05	20.44	17.00	13.13	7.79	4.46	2.99	2.02	1.21	100
4	9.00	13.13	16.10	19.49	15.47	11.53	7.73	3.56	2.54	1.44	100
5	6.87	9.50	11.87	15.11	16.04	17.85	11.54	6.10	3.29	1.84	100
6	5.45	6.31	8.07	10.62	15.90	18.68	17.10	11.07	4.48	2.31	100
7	4.57	4.96	6.08	7.46	11.13	13.87	19.54	19.24	9.52	3.63	100
8	4.07	4.32	4.61	5.14	6.24	9.36	15.70	23.94	19.90	6.71	100
9	3.23	3.53	3.81	4.22	4.88	6.15	8.92	14.58	29.54	21.15	100
10	2.55	2.82	3.33	3.21	3.87	3.94	5.29	8.43	17.13	49.44	100
Total	10.71	10.51	10.39	10.32	10.16	9.99	9.85	9.65	9.38	9.04	100

Table A2. Percentages of individuals who live in the nth decile of deprivation in 2000 and the nth decile of deprivation in 2011. Estonia.

Decile of deprivation 2001	Decile of deprivation 2011										
	1	2	3	4	5	6	7	8	9	10	Total
1	37.50	9.28	7.35	6.35	6.41	6.48	6.31	4.67	5.36	10.29	100
2	19.22	20.76	13.56	10.09	12.95	8.27	4.66	3.10	3.64	3.76	100
3	11.46	15.56	15.61	16.56	9.15	13.75	6.96	3.26	3.81	3.88	100
4	8.65	11.20	13.82	13.38	12.28	13.90	11.07	6.54	6.37	2.79	100
5	8.99	9.62	10.67	15.40	10.61	14.02	6.34	12.46	7.16	4.73	100
6	6.36	8.63	8.78	8.23	9.14	9.01	12.95	6.69	17.97	12.24	100
7	5.02	7.59	6.09	7.68	6.35	5.84	16.43	14.96	17.13	12.93	100
8	6.65	7.45	6.41	5.69	12.36	5.83	6.91	15.85	16.38	16.46	100
9	6.12	5.15	7.08	3.55	8.66	11.21	14.20	18.56	10.93	14.53	100
10	11.66	5.41	4.41	3.75	5.39	6.81	13.50	13.01	10.94	25.12	100
Total	10.22	9.97	9.64	9.56	9.58	9.92	10.22	10.27	10.47	10.15	100

Table A3. Percentages of individuals who live in the nth decile of deprivation in 2001 and the nth decile of deprivation in 2011. Sweden.

Decile of deprivation 2001	Decile of deprivation 2011										
	1	2	3	4	5	6	7	8	9	10	Total
1	37.55	-	-	-	12.12	14.89	10.94	11.17	8.21	5.13	100
2	-	-	-	-	-	-	-	-	-	-	100
3	5.72	-	-	-	52.25	24.92	8.24	5.14	2.49	1.23	100
4	5.67	-	-	-	34.10	34.19	11.87	7.93	3.92	2.32	100
5	5.36	-	-	-	19.96	34.66	17.69	13.09	5.86	3.38	100
6	6.15	-	-	-	14.28	28.25	21.19	16.28	8.87	4.98	100
7	5.49	-	-	-	11.15	21.66	22.43	21.68	11.19	6.40	100
8	5.37	-	-	-	8.49	16.64	19.02	24.54	16.51	9.41	100
9	4.78	-	-	-	6.48	13.01	14.98	21.76	20.27	18.72	100
10	4.83	-	-	-	4.52	9.42	10.35	13.78	17.07	40.04	100
Total	6.38	-	-	-	18.54	24.08	15.90	15.39	10.37	9.35	100

Note: Because in 20-40% of the neighbourhoods in Sweden no one receives unemployment or welfare benefits, these deciles get collapsed into the first decile (least deprived). Therefore the matrix for Sweden shows empty cells in the least deprived deciles.

Table A4. Percentages of individuals who live in the nth decile of deprivation in 2001 and the nth decile of deprivation in 2011. United Kingdom.

Decile of deprivation 2001	Decile of deprivation 2011										
	1	2	3	4	5	6	7	8	9	10	Total
1	70.67	7.43	6.00	4.89	3.71	2.63	1.92	1.40	0.94	0.41	100
2	7.32	69.26	5.78	4.98	3.94	3.05	2.19	1.77	1.14	0.57	100
3	6.27	6.21	67.70	5.11	4.41	3.60	2.63	1.95	1.42	0.71	100
4	5.48	5.78	5.63	66.34	4.61	4.02	3.03	2.44	1.76	0.91	100
5	4.40	5.24	5.16	5.36	65.26	4.54	3.65	3.03	2.18	1.18	100
6	3.69	4.29	4.85	5.00	5.35	64.07	4.53	3.51	3.08	1.63	100
7	3.36	3.89	4.17	4.67	4.92	4.88	63.28	4.60	3.87	2.36	100
8	2.48	3.41	3.60	4.03	4.55	4.83	5.36	63.25	5.02	3.47	100
9	1.76	2.38	2.82	3.60	3.93	4.65	5.41	6.36	63.72	5.37	100
10	1.18	1.71	1.91	2.34	3.41	3.87	4.55	5.98	7.84	67.22	100
Total	12.19	12.50	11.98	11.44	10.73	9.78	9.02	8.46	7.62	6.28	100