

Manley, David; Van Ham, Maarten

Conference Paper

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50th Congress of the European Regional Science Association: "Sustainable Regional Growth and Development in the Creative Knowledge Economy", 19-23 August 2010, Jönköping, Sweden

Provided in Cooperation with:

European Regional Science Association (ERSA)

Suggested Citation: Manley, David; Van Ham, Maarten (2010) : Living in deprived neighbourhoods in Scotland. Occupational mobility and neighbourhood effects., 50th Congress of the European Regional Science Association: "Sustainable Regional Growth and Development in the Creative Knowledge Economy", 19-23 August 2010, Jönköping, Sweden, European Regional Science Association (ERSA), Louvain-la-Neuve

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Living in Deprived Neighbourhoods in Scotland: Occupational Mobility and Neighbourhood Effects.

Maarten van Ham¹ & David Manley²

Centre for Housing Research, School of Geography and Geosciences, University of St Andrews, North Street, St Andrews, Fife, KY169AL

¹maarten.vanham@st-andrews.ac.uk

²d.manley@st-andrews.ac.uk

Abstract: The idea that living in a deprived neighbourhood negatively affects the occupational mobility of residents has been embraced enthusiastically by many policy makers and academics. As a result, area based initiatives are now widely used to improve an individual's life course through the diversification of the neighbourhood in which they live. However, these area based initiatives have received increasing criticism from academics stating that there is no solid evidence base that neighbourhood effects really exist. One of the main problems is that many studies use cross-sectional data which does not allow the separation of cause and effect. We use longitudinal data from the Scottish Longitudinal Study (SLS) to investigate the influence of neighbourhood context on occupational mobility outcomes. The SLS allows us to follow individuals between 1991 and 2001, using linked records from both Censuses. Using this data we examine whether, for employed individuals, living in a deprived neighbourhood reduces occupational mobility measured using ISEI scores; for individuals out of work, we examine whether living in a deprived neighbourhood reduces their chances of obtaining work. Using regression models, we control for a range of individual and household characteristics. All other things being equal, those individuals living in more deprived communities should experience significant negative effects accrued from their neighbourhood if the neighbourhood effects thesis is to be confirmed.

Key words: Tenure Mix; Deprivation; Neighbourhood Effects; Occupational Mobility; Longitudinal Data; Scotland

Introduction

There is a strong belief among many academics and policy makers that living in deprived neighbourhoods has a negative effect on residents' life chances over and above the effect of their individual characteristics. The body of literature on these so-called neighbourhood effects is growing quickly (see for a review Ellen & Turner, 1997; Galster, 2002; Dietz, 2002; Durlauf, 2004) and neighbourhood effects have been reported on outcomes such as school dropout rates (Overman, 2002); childhood achievement (Galster et al., 2007); transition rates from welfare to work (Van der Klaauw & Ours, 2003; Simpson et al., 2006); deviant behaviour (Friedrichs & Blasius, 2003); social exclusion (Buck, 2001); and social mobility (Buck, 2001). Theoretical explanations of neighbourhood effects include role model effects and peer group influences, social and physical disconnection from job-finding networks (Tunstall & Fenton, 2006), a culture of poverty leading to dysfunctional values (Wilson, 1987), discrimination by employers and other gatekeepers, access to low quality public services, and high exposure to criminal behaviour.

The neighbourhood effects discourse has had a major impact on urban, neighbourhood and housing policies and has influenced governments to spend large sums of money on area based policies to tackle poverty. Creating neighbourhoods with a balanced socio-economic mix of residents is a common strategy to tackle assumed negative neighbourhood effects. Mixed housing tenure policies are often used as a vehicle to create more socially mixed neighbourhoods. The idea is that mixing homeowners with social renters will create a more diverse socio-economic mix in

neighbourhoods, removing the potential of negative neighbourhood effects (Musterd & Anderson, 2005). Mixed housing strategies are stated explicitly by many governments including those in the Netherlands, the United Kingdom, Germany, France, Finland, and Sweden (Atkinson & Kintrea, 2002; Kearns, 2002; Musterd, 2002).

Despite the apparent consensus that neighbourhood effects exist – and that mixing tenures is an effective remedy – there is a small, but growing body of critical empirical literature offering an alternative view (e.g. Oreopoulos, 2003; Bolster et al., 2007). This critical literature identifies that there is surprisingly little convincing evidence that living in deprived neighbourhoods really affects individual life chances and concludes that policies should target individuals rather than the areas where they live (Cheshire, 2007). Durlauf (2004) reports that quasi-experimental studies, such as the Gautreaux and Moving to Opportunity programs (Rosenbaum, 1995; Ludwig et al., 2001; Goering et al., 2002; Katz et al., 2001) or randomised education studies (see Leventhal & Brooks-Gunn, 2004) find little impact of neighbourhood characteristics on adults' outcomes while the bulk of non-experimental observational studies (see for example McCulloch, 2001; Buck, 2001) do find effects. The key problem in the empirical investigation of neighbourhood effects is the (econometric) identification of causal relationships (Durlauf, 2004) and it can be expected that most existing 'evidence' from non-experimental observational studies suffers from reverse causality (Cheshire, 2007). This includes studies on the effect of tenure mix policies, most of which are either ecological in nature (Priemus, 1998; Graham et al., 2009; Smith, 1999; Tunstall, 2003) or use cross sectional data (Lee et al., 1994; Ostendorf et al., 2001; Jupp, 1999; McCulloch, 2001; Martin & Watkinson, 2003). The existing evidence that mixed tenure policies have the desired effect is at best inconclusive (Musterd & Andersson, 2005).

A major step forward in modelling neighbourhood effects is the use of longitudinal data with the potential to explicitly model the directions of causality in the correlation between neighbourhood characteristics and individual level outcomes (see for example Oreopoulos, 2003; Bolster et al., 2007; Galster et al., 2008). We found one study which explicitly models the effect of tenure mix on occupational mobility outcomes using large scale Swedish longitudinal data (Musterd & Anderson, 2005). Another major step forward in the study of neighbourhood effects is the investigation of the most relevant scale of neighbourhoods (Lee et al., 1994; Galster, 2001; Bolster et al., 2007; Graham et al., 2009). Most existing studies do not address this issue which could lead to bias in modelling outcomes.

The study presented in this paper is designed to investigate the effect of neighbourhood tenure mix and deprivation on individual occupational mobility. We will study occupational mobility in the labour market for employed individuals between 1991 and 2001 in Scotland. This paper contributes to the existing literature in three ways. First, we use individual level data representative for the whole of Scotland; second, we use longitudinal data covering a 10-year period; and third, we investigate the effect of geographical scale by using two different definitions of neighbourhoods. We use unique data from the Scottish Longitudinal Study (SLS) which is a 5.3% sample of the Scottish population linked through time by matching Census forms from 1991 and 2001. Using this data we are able to link 1991 neighbourhood characteristics (using two definitions of neighbourhoods) to 2001 labour market outcomes. The data is not without limitations, but it is one of the best longitudinal datasets available to study neighbourhood effects. Using this data we will investigate the following two questions:

1. To what extent does 1991 neighbourhood deprivation influence occupational mobility for those individuals who are employed during 1991 and 2001?
2. If there is an effect of neighbourhood deprivation is there any evidence that it might be driven by self-selection into neighbourhoods by households?

Background

There is an ever growing body of literature investigating the potential effects of neighbourhood characteristics on an individual's life chances (see for literature reviews Ellen & Turner, 1997; Friedrichs, 1998; Leventhal & Brooks-Gunn, 2000; Dietz, 2002; Sampson et al., 2002; Durlauf, 2004; Bolster et al., 2007). Wilson (1987) is generally seen as the starting point of the interest in neighbourhood effects (Durlauf, 2004). According to Wilson (1991, p.650) “[t]he central problem of the underclass is joblessness reinforced by increasing social isolation in impoverished neighbourhoods”. Wilson argued that structural ‘concentration effects’ arise from living in deprived neighbourhoods, which might negatively affect residents' access to job information network systems. Other explanations of neighbourhood effects are based on role model effects or peer group influences (Manski, 2000; Blume & Durlauf, 2001; Brock & Durlauf, 2005). The idea is that a lack of role models – people with a relatively high level of education and a job – in some neighbourhoods can cause low expectations of what residents think they can achieve in their current situation (Bolster et al., 2007). It is thought that in extreme cases this can lead to a ‘culture of poverty’ effect (Wilson, 1987) where unemployment is not a consequence of structural problems but of a cultural commitment to dysfunctional and irrational values resulting in the wish of the ‘underclass’ to follow alternative values counter to the norms of society. The rejection of these norms may lead to an increased participation in anti-social activities, and opting out of education and employment. The culture of poverty argument can turn into a structural neighbourhood effect when employers refuse to hire residents from certain neighbourhoods based on the reputation of the neighbourhood as a whole (see Wilson, 1991; Wacquant, 1993; Permentier et al., 2007).

As stated in the introduction, there is surprisingly little convincing empirical evidence that living in deprived neighbourhoods really affects individual life chances. It has been argued that most evidence from non-experimental observational studies suffers from reversed causality. Durlauf (2004) identifies a range of conceptual and statistical problems that might explain why many observational studies find a negative effect of living in deprived neighbourhoods on individual outcomes. Identification of causal effects is the main problem. This is most acute in Manski's (1993) reflection problem and related issues of (self) selection, but also omitted variable bias plays a role (Moffitt, 2001; Brock & Durlauf 2001, 2005; Durlauf, 2004). It is highly likely that those most at risk of unemployment and low pay are sorted into the most deprived neighbourhoods as these offer the most affordable dwellings. Using cross sectional data a strong correlation can be found between living in deprived neighbourhoods and being unemployed. However, this does not necessarily mean that living in deprived neighbourhoods makes people unemployed, it is more likely that unemployed people live in deprived neighbourhoods because living in affluent ones costs too much (Cheshire, 2007). Using longitudinal data instead of cross-sectional data can solve part of the problem as such data has the potential to explicitly model the direction of causality in the correlation between neighbourhood characteristics and individual level outcomes.

Galster and colleagues (2008) used a longitudinal database including all working age adults in metropolitan Sweden (1991-1999) to investigate whether neighbourhood income mix is related to average earnings over a four year period. They concluded that there were statistically and substantively significant neighbourhood effects, especially for males. Other studies using longitudinal data have found no or very limited evidence of neighbourhood effects (for example Oreopoulos, 2003; Bolster et al., 2007). Oreopoulos (2003) used administrative data from Toronto to study labour market outcomes of adults who were assigned, when younger, to different social housing projects in neighbourhoods with very different living conditions and levels of exposure to crime and poverty. The study compares employment outcomes of youth living in the social housing projects with outcomes of youth living in private housing in the same neighbourhoods. Because assignment of families to the social housing projects was based mainly on household size and families could not specify neighbourhood preferences, the selection mechanism into neighbourhoods of those in social housing approached an experimental setting. For those youth in private housing, Oreopoulos found substantive positive effects on earnings, employment and

welfare participation from living in wealthier areas (after controlling for observable family characteristics). However, no neighbourhood effects were found for those in social housing. Differences in neighbourhood context could not explain large variations in labour market outcomes for those in social housing. The absence of 'neighbourhood effects' for those in social housing leads to the conclusion that the 'neighbourhood effects' found for those in private housing are most likely to be the result of selection into neighbourhoods Oreopoulos (2003).

Bolster and colleagues (2007) used unique longitudinal data from the British Household Panel Survey (BHPS) to investigate the relationship between neighbourhood disadvantage and income growth over 1-, 5- and 10-year windows. They found no evidence of a negative relationship between neighbourhood disadvantage and subsequent income growth (controlling for individual characteristics). Unexpectedly, they found some small positive effects for those in couples and for home owners (but no effects for renters). Bolster and colleagues (2007) discuss the importance of considering different spatial scales of neighbourhoods in studying neighbourhood effects (see also Graham et al., 2009). In most studies the choice of spatial scale is simply driven by the availability of data and the detail of geo-references available. Bolster and colleagues (2007) constructed 'bespoke' neighbourhoods around individuals on different scales. They also investigated the effect of neighbouring neighbourhoods on outcomes. Conditional on that they found that neighbourhoods matter little, they found that local neighbourhoods provide more explanation than broader ones (see also Buck, 2001). They explain this by the greater internal heterogeneity of larger areas.

Given the lack of conclusive evidence that neighbourhood effects exist, it is somewhat surprising that many policy makers, especially in the European context, have so enthusiastically embraced policies to create mixed neighbourhoods. See, for example policy documents for Scotland: Scottish Homes, 2001; Communities Scotland, 2004; Scottish Government, 2006; Scottish Government, 2007. The general idea is that dispersing concentrations of poverty helps to remove (part of) the assumed neighbourhood effects problem (Hochschild, 1991). A popular strategy is to create more socially mixed neighbourhoods through creating mixed housing tenure neighbourhoods. It is assumed that mixing those in social renting with homeowners facilitates labour market access for the poor through the introduction of job networks and positive role models, breaking down cultures of poverty. The existing evidence that mixed tenure policies have the desired effect is at best inconclusive (Musterd & Andersson, 2005) and the sustainability of mixed (tenure) neighbourhoods has been questioned (Van Ham & Feijten, 2008; see also Van Ham and Clark, forthcoming).

There are several studies investigating whether mixed tenure neighbourhoods have more positive effects on individual outcomes than predominantly socially rented neighbourhoods (e.g. Schwartz & Tajbakhsh, 1997; Power, 1997; Jupp, 1999; Pawson et al., 2000; Atkinson & Kintrea, 2000; Kleinman, 2000; Ostendorf et al., 2001, Smith, 2001; Wood, 2003; Arthurson, 2005; Graham et al., 2009). Most of these studies are either ecological or cross-sectional in nature, limiting their value in investigating causal relationships. The evidence from these mostly small scale studies is varied, providing little basis for generalization. Atkinson and Kintrea (1998), for example, interviewed residents of a mixed tenure development in Edinburgh, Scotland and found that there was little interaction between renters and owners and that employment outcomes were not benefited by living in a mixed neighbourhood. Jupp (1999) used a survey of residents of 10 estates across Britain with various proportions of social housing to investigate social interaction between residents. Jupp showed that interactions were highly spatially concentrated and that little interaction occurred between tenure groups. It was also found that residents of mixed tenure estates did not perceive tenure mix as beneficial (Jupp, 1999).

To our knowledge, the only work explicitly investigating the effect of tenure mix on employment using large scale longitudinal data is by Musterd and Anderson (2005) for Sweden. Musterd and Anderson used a series of cross tabulations to investigate to what extent tenure mix and social mix are associated on the neighbourhood level and how changes in employment status of

individuals between 1991 and 1999 were related to the (social) homogeneity of neighbourhoods. An entropy measure was used to describe the variety of tenures in neighbourhoods and social mix was measured using data on the distribution of work related income. They demonstrated that in Sweden, tenure mix does not necessarily result in income mix. Those most likely to stay in employment over time lived in high income neighbourhoods with an either a very homogeneous or very heterogeneous tenure structure. Those living in low income neighbourhoods with an either homogeneous or very heterogeneous tenure structure were much less likely to stay in employment with those in the heterogeneous areas having the worst outcomes. Musterd and Anderson (2005) concluded that compared to living in mono tenure neighbourhoods, living in mixed tenure neighbourhoods does not automatically lead to better employment outcomes. Surprisingly they did not distinguish between mono ownership and mono social renting neighbourhoods while one would expect very different outcomes.

In this paper we will investigate the effect of different levels of tenure mix and deprivation on individual labour market outcomes for Scotland. Over the last few decades, social housing policies in Scotland have resulted in the creation of large mono-tenure estates, which still exist despite erosion through redevelopment and the Right-to-Buy – which allowed households in social housing to buy the property they lived in with considerable discounts (Jones & Murie, 2006). These large estates of social renting tend to represent concentrations of poverty, where long term unemployment is a problem. In this paper we will investigate whether these high concentrations of social renting have a negative effect on an individual's occupational mobility between 1991 and 2001. We will not only investigate the effect of tenure mix on occupational mobility, but also whether tenure mix offers an explanation over and above measures of deprivation. Our work is by no means free of all the problems commonly found in the neighbourhood effects literature as identified by Durlauf (2004). However, by using individual level longitudinal data, covering a 10 year period and by investigating the effect of different levels of mixing and explicitly testing the effect of the geographical scale of neighbourhoods we believe that our study offers a worthwhile contribution to the mixed tenure and neighbourhood effects literature.

Data and Methods

The individual-level data were assembled from the Scottish Longitudinal Study (SLS) a 5.3% sample of the Scottish population linked through time by matching Census forms from 1991 and 2001 (Boyle et al., 2008). Approximately 274,000 SLS members were identified from the 1991 census and information for these individuals was linked from the 2001 census. This longitudinal design allows researchers to follow the same individuals over a 10 year period, investigating the effect of 1991 characteristics on 2001 outcomes. A unique feature of the data, which makes it highly suitable for our purposes, is that the data are geocoded. With special permission, researchers have the possibility of linking area characteristics on a low geographical scale to individual SLS members.

The research population for this paper consisted of all individuals who were aged between 15 and 50 years old in 1991 (so between 25 and 60 years old in 2001), and excluded people who were in education, giving care, or retired. Individuals were included in the analysis if they were identified as being employed in 1991 and 2001 and had a valid International Socio-Economic Index of Occupational Status (ISEI) value recorded. The ISEI is a standard classification of job type which provides a numeric value for each job (see Ganzeboom *et al.*, 1992). It has a number of advantages over schema such as the National Statistics Socio-economic Classification (NS-SEC) frequently used for social mobility data in the United Kingdom as it is a continuous scale. As such it is possible to measure small changes over time as well as the larger changes that would be picked up when comparing NS-SEC outcomes.

The dependent variable in the models is the change between an individual's ISEI score

between 1991 and 2001. A positive change indicates that an individual experienced upward occupational mobility and that they increased their ISEI classification, whilst a negative score indicates that an individual experienced downward occupational mobility and that their ISEI score decreased. As the difference in ISEI scores is continuous we use ordinary least squares (OLS) regression. An additional factor that must be taken into account are the non-comparability of risks for individuals in the dataset. Individuals with a high ISEI score cannot increase their score as much as an individual with a low ISEI value, the so-called ceiling effect. Equally, an individual with a low ISEI value cannot experience a drop as great as an individual with a high ISEI value, the so-called floor effect. As we wish to analyse all individuals in one model, it is necessary to include the starting ISEI of an individual (the ISEI score from 1991) in the model as an independent variable. Because the models included both individual level characteristics and area level characteristics and the data included multiple individuals per area, the standard errors have been adjusted for clustering of individuals on the area level.

There is much debate on what is the best way to define ‘neighbourhoods’ using administrative data (Kearns & Parkinson, 2001; Galster, 2001; Manley et al., 2006) and many studies use relatively large-scale areas to capture neighbourhood effects (Bolster et al., 2007). Several studies have compared outcomes for different geographical scales and found significant differences (See Buck, 2001; Bolster et al., 2007; Graham et al., 2009; van Ham and Manley, 2010). We are aware that there is no one-to-one relationship between administrative areas and neighbourhoods as perceived by residents (see Galster, 2001), but it can be argued that smaller areas come closer to what people may perceive as their neighbourhood than larger areas. The larger the area, the more likely that areas are internally heterogeneous and differences within areas ‘average out’ any extremes. Generally speaking, studies found larger ‘neighbourhood effects’ of neighbourhood characteristics measured at a low spatial scale. In our study we estimated separate models using area level characteristics measured on two geographical scales: Output Areas (OAs) and Consistent Areas Through Time (CATTs). In Scotland there are 42,604 OAs containing on average 119 individuals. CATTs are more extensive areas with an average population of 503 (ranging from 50 to 18,510 people). OAs and CATTs are hierarchical, and the OAs all nest continuously within CATTs.

We included three area level characteristics in our models, all measured on the OA and CATT level: an urban-rural classification, a measure of housing tenure mix and a measure of deprivation (see Table 1 for descriptives). The area descriptors were all measured for 1991 and are not allowed to vary over time. The main reason for fixing the area characterisation in time is identification of causality. It would be wrong to associate change in occupational status between 1991 and 2001 with 2001 neighbourhood characteristics because the 2001 characteristics might be the result of the transition and not the cause (e.g. people moving to a better neighbourhood improving their occupational status). The urban-rural classification is based on population size and access to concentrations of population (Scottish Executive, 2004) and measured in six categories: (i) cities (over 125,000 people); (ii) urban areas (10,000 to 125,000 people); (iii) small towns (3000 to 10,000 people or within than 30 min from towns with 10,000 people or more); (iv) remote towns (3000 to 10,000 people, over 30 minutes from settlement of over 10,000); (v) accessible rural (less than 3000 people and within 30 min from places with over 10,000 people); and (vi) remote (settlements 40 with under 3000 people, over 30 min from places with over 10,000 people). The urban-rural classification serves as a proxy for access to job opportunities (see also Van Ham et al., 2001).

We used the percentage of social renting in an area as a measure of housing tenure mix. In Scotland owner occupation is the majority tenure (52.4% in 1991), followed by social renting (40.3%) and private renting (7.3%). Because it is highly unlikely that the relationship between neighbourhood tenure mix and labour market transitions is linear (see Galster, 2007) we used 5 categories to describe the level of social renting: 0-20%; 20-40%; 40-60%; 60-80%; and 80-100%.

We consider the middle three categories as mixed tenure areas, while the extremes at each end of the distribution can be thought of as mono-tenure areas. To measure the level of deprivation in an area we used the Carstairs index (Carstairs & Morris, 1990) which is based on the level of male unemployment in an area, the number of households without a car, the level of overcrowding (over 1 person per room), and the social class of heads of households (categories IV and V). Deprivation was measured in 5 categories (quintiles), each containing 20% of the overall deprivation distribution.

— Table 1 about here please —

We present our models in several steps, adding new variables in each step. We start with neighbourhood characteristics and then add several individual level and household level characteristics to our models. This design allows us to appreciate the full correlation between neighbourhood characteristics and labour market outcomes, but also allows us to assess to what extent other variables account for this initial correlation. We included a wide range of individual and household characteristics in our models. An overview of these variables can be found in Table 1. Age, gender, level of education, ethnicity, housing tenure, and a variable indicating whether or not the SLS member had a working partner were all measured for 1991 to avoid reverse causality problem (see also above). For the SLS members without a partner, the average of the respondents with a partner is substituted. Because the model contains a variable indicating whether a partner is present, this substitution of the means leads to unbiased coefficients of the ‘partner works’ dummy for those with a working partner (compare Cohen and Cohen, 1975, chapter 7). We also included several variables indicating change between 1991 and 2001: change in self reported health; change in household composition, change in the presence of children; and a variable indicating whether or not an SLS member had moved between 1991 and 2001. We tested for interaction effects between the independent variables in our models and reported only the significant effects between female and mover status. We also ran our models on various sub groups in the data (by age, education, mover status and tenure). The only subdivision of the data leading to new insights was the split by tenure (see also Oreopoulos, 2003; Bolster et al., 2007). Because of restrictions in the data we were only able to estimate separate models for home owners and social renters. There were not sufficient private renters to run separate models for this group.

As in most neighbourhood effects studies, the outcomes of our models are possibly affected by omitted variable bias which arises when unobserved variables are correlated with included variables. A possible strategy to deal with omitted variable bias is to use a fixed effects model, which controls for all measured and unmeasured static individual and neighbourhood level characteristics (such as gender, ethnicity, but also whether someone is, for example, a ‘risk taker’). The dependent and independent variables in a fixed effects model measure change between two points in time (see Galster et al, 2008 for an example of a difference model). Although a fixed effects model (to some extent) deals with omitted variable bias, it also introduces other problems (Allison, 2005). Using a fixed effects model we would not be able to include static neighbourhood characteristics, only changes in characteristics between 1991 and 2001. As many of the SLS members moved between 1991 and 2001, the 2001 neighbourhood characteristics (and therefore the change between 1991 and 2001) could be a result rather than a cause of occupational mobility, as discussed above. For example, people could have moved to a better neighbourhood after they found a (better) job (see also Bolster et al., 2007). Therefore, we have decided not to use a fixed effects model.

Results

Table 2 show six stepwise regression models estimating the occupational mobility of individuals

between 1991 and 2001. In each subsequent model we add additional sets of variables, starting with neighbourhood level characteristics (all measured at the OA level) and followed by individual and household level characteristics. Model 1 includes only the level of neighbourhood deprivation, categorised in quintiles. After the work of Wilson, (1987) we would expect that the higher the level of deprivation, the less likely an individual is to experience upward occupational mobility. This is confirmed by the coefficients in model 1.

For model 2 we include the proportion of social renting in the neighbourhood as a proxy for mixed tenure. According to the mixed literature, if the policy of increasing mix in neighbourhoods is successful we would expect to observe a drop in the disadvantage from living in a deprived neighbourhood. The coefficients for the deprivation quintiles reduce in magnitude compared to the first model, but are still highly significant. Additionally, living in a neighbourhood with a higher proportion of social renting is also associated with a reduction in individual occupational mobility. The coefficients show that the relationship between occupational mobility and the proportion of social renting in the neighbourhood is linear. The association could be explained by selection effects, with those individuals least likely to experience upward mobility living in neighbourhoods with higher levels of social renting. These are important findings because if our results could be interpreted as a neighbourhood effect, also those living in deprived neighbourhoods with predominantly home owners will be affected. In that case, creating a mix of home owners and social renters is unlikely to have a positive effect unless it coincides with creating a socio-economic mix. But as demonstrated for Sweden, tenure mix does not necessarily result in income mix (Musterd & Anderson, 2005).

In Model 3 an urban-rural classification, as a proxy for access to employment opportunities, is added to the model. The results show that, compared to those living in the most remote parts of Scotland, those living in accessible rural areas are slightly more likely to experience upward social mobility. Including the urban-rural classification in the model does not lead to substantial changes in the coefficients of the other neighbourhood level variables. In Model 4 individual level qualifications measured in 1991 are included. The results show that with increasing level of education the probability of upward social mobility 2001 increases. Inclusion of individual level qualifications lowers the coefficients of the neighbourhood level deprivation effects. It is notable that the coefficients for education are much larger than for any of the other independent variables included so far. Model 5 also includes 1991 tenure and shows that private renters are not significantly different to social renters in terms of their likelihood of experiencing upward social mobility. Those individuals living in homes that they own, or are buying, are much more likely to experience upward occupational mobility than social renters. The association between individual tenure, neighbourhood characteristics and labour market outcomes will be further explored in later models where we split the data by tenure.

Finally, Model 6 is the full model, including a range of control variables. With increasing age the probability of upward social mobility drops. Women are more likely than men to experience upward occupational mobility. The above results are largely in line with what we would expect based on the labour market literature (e.g. Van Ham, 2002). Next a set of variables indicating change between 1991 and 2001 is included in the model. Compared to those without a self-reported limiting long term illness in either 1991 or 2001, those with a long term limiting illness in only 2001 are less likely to experience upward occupational mobility. Compared to SLS members who were in a couple in both 1991 and 2001, singles in both years and those who became single between 1991 and 2001 are less likely to experience upward occupational mobility. SLS members without children in both years are less likely to experience upward occupational mobility by 2001 than SLS members with children in both years.

After controlling for a range of variables, in the full model (Model 6) the effects of living in a deprived neighbourhood is still highly significant, although the coefficients have decreased substantially in magnitude. There is no evidence of advantage to the individual accruing from living

in a mixed neighbourhood, and living in concentrations of social housing confers additional disadvantage. Since our data does not allow us to model the sorting mechanism into neighbourhoods prior to 1991, we can not rule out that this small effect is the result of sorting instead of causality (a case of omitted variable bias). As a general observation it is worth mentioning that, as expected, the neighbourhood level variables contribute relatively little to the overall explanatory power of the model compared to the individual and household level characteristics.

These analyses were re-run for the CATT level neighbourhoods and the outcomes observed were broadly similar (not shown). The overall coefficients for the neighbourhood level variables were slightly smaller than observed in the OA level models. The coefficients for the individual and household level characteristics were very similar to those discussed above. As a result we move forward focusing on the OA level models alone, as we suggest that the more local level neighbourhoods are more likely to represent the interaction spaces in which social-interactive mechanisms, such as those posited by Wilson (1987), can occur.

One particular interesting finding in almost all our models was that introducing individual level tenure caused the effects of neighbourhood level tenure mix variables to change considerably. Bolster and colleagues (2007), using data from the British Household Panel Survey (BHPS), reported weaker effects between neighbourhood types and income levels for those in rented accommodation compared to owners. Oreopoulos (2003), using registration data from Toronto, found strong neighbourhood effects for those in private housing, but no effects for those in social housing. Inspired by these findings we disaggregated our models and present separate models for home owners and social renters. The number of private renters in our data was not sufficiently large to estimate separate models for this group.

Separate models for home owners and social renters

Following the analysis of van Ham and Manley (2010), we modelled the outcomes for social renters separately to the outcomes for owner occupiers. Table 3 includes 4 models of occupational mobility. Models 7 and 8 include only social renters, and models 9 and 10 include only owner occupiers. For comparison with the models presented in table 2 we present the initial models for neighbourhood deprivation, followed by the full models.

We will only discuss the effects of the two neighbourhood characteristics of interest, as the coefficients for individual and households variables are similar to those observed for the full population. The most interesting result is that in the models for social renters (models 7 and 8) we found no significant association between neighbourhood deprivation and the level of neighbourhood tenure mix and occupational mobility. In contrast to the models for social renters the models for home owners (models 9 and 10) we find a consistent and significant negative association between living in deprived neighbourhoods and living in neighbourhoods with higher levels of social renting occupational mobility. The outcomes at the CATT level are broadly similar.

The differences in 'neighbourhood effects' between homeowners and (social) renters in our models are consistent with findings by Oreopoulos (2003) and Bolster and colleagues (2007). Bolster and colleagues (2007) do not attempt to explain the differences found, but Oreopoulos (2003) suggests that the absence of 'neighbourhood effects' for social renters in his study of Toronto indicates that the 'neighbourhood effects' found for those in the private sector are the result of (self)selection and not of causation. Those in social renting were allocated a dwelling based on household size and could not specify where they wanted to live. The nature of the allocation mechanism in social housing prevents much selection across neighbourhood types for social renters and approaches a quasi-experimental setting (Oreopoulos, 2003). Those in the private sector on the other hand had more freedom in where to live and their choices of neighbourhood were strongly affected by market mechanisms. As a result, those most likely to experience static or downward social mobility are also likely to select themselves into a more affordable dwelling, often in more

deprived neighbourhoods. As a consequence of the different selection mechanisms, the estimates for neighbourhood effects are likely to be closer to reality for social renters than estimates from a sample of those in the private sector (Oreopoulos, 2003). This line of reasoning used for the Toronto study is likely to explain the differences found between social renters and home owners in analyses for Scotland.

— Table 3 about here please —

Conclusions

This study was designed to investigate the effects of neighbourhood deprivation and neighbourhood tenure mix on occupational mobility. In the introduction we identified that despite the apparent consensus that neighbourhood effects exist – and that mixing tenures is an effective remedy – there is surprisingly little convincing empirical evidence that neighbourhood characteristics can really affect individual life chances. It can be expected that most existing ‘evidence’ of neighbourhood effects from non-experimental observational studies – including the positive effects of living in mixed tenure neighbourhoods – suffers from reverse causality. We identified that a major step forward in modelling neighbourhood effects is the use of longitudinal data which has the potential to explicitly model the direction of causality in the correlation between neighbourhood characteristics and individual level outcomes. We also identified that studies should take more care in choosing the most relevant spatial scale of neighbourhoods.

Using data from the Scottish Longitudinal Study (SLS) we contributed to the existing literature in three ways. First, we used individual level data representative for the whole of Scotland; second, we used longitudinal data covering a 10-year period; and third, we investigated the effect of geographical scale by using two different definitions of neighbourhoods. We initially found a consistent negative effect of living in deprived neighbourhoods on individual occupational mobility for both spatial levels. A more detailed analysis, with separate models for homeowners and social renters, showed that the ‘neighbourhood effects’ found were only significant for home owners and not for social renters. This is the main finding of our paper.

Following Oreopoulos (2003) we suggest that the lack of evidence of neighbourhood effects for social renters indicates that the ‘neighbourhood effects’ found for home owners are the result of (self)selection and not of causation. Those home owners in 1991 most likely to experience static or downward mobility are also likely to have selected themselves into deprived neighbourhoods as dwellings in these neighbourhoods are relatively affordable. The 1991 allocation mechanism in the social housing sector (before choice-based letting was introduced) prevented much selection across neighbourhood types. Although our data does not allow us to explicitly model the selection mechanism into deprived neighbourhoods prior to 1991, the results suggest selection effects are behind the ‘neighbourhood effects’ found for home owners. Omitted variables are likely to contribute to the explanation of both selection into neighbourhoods and labour market outcomes for home owners.

Our findings offer a significant contribution to the understanding of neighbourhood effects and the potential effects of tenure mix policies. Our results have important methodological and policy implications. We showed that it is important to measure neighbourhood characteristics at different spatial levels as these can produce different outcomes. We also showed that it is important to model neighbourhood effects for sub samples of the data. One should be careful drawing conclusions from studies only measuring neighbourhood characteristics on one spatial level and using the whole dataset. Ideally all neighbourhood effects studies should use longitudinal data and explicitly model selection mechanisms into neighbourhoods.

We found no evidence that the segregation of poor individuals into deprived neighbourhoods and neighbourhoods with high concentrations of social renting has negative effects on labour

market outcomes, once we had controlled for individual characteristics. Consequently, we found no evidence that it is beneficial for individual labour market outcomes to mix home owners and social renters within neighbourhoods. This is in line with what Cheshire notes: “forcing neighbourhoods to be mixed in social and economic terms is, therefore, mainly treating the symptoms of inequalities rather than the causes” (2008, p.30). Given the importance of individual characteristics in understanding occupational mobility outcomes in our models, anti-poverty policy should target individuals, aiming at improving individual experiences and opportunities.

"The help provided by staff of the Longitudinal Studies Centre - Scotland (LSCS) is acknowledged. The LSCS is supported by the ESRC/JISC, the Scottish Funding Council, the Chief Scientist Office and the Scottish Government. The authors are responsible for the interpretation of the data. Census output is Crown copyright and is reproduced with the permission of the Controller of HMSO and the Queen's Printer for Scotland."

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Table 1 Variable summary statistics

N= 56,287		
<i>Neighbourhood level variables</i>	OA	CATT
Carstairs Deprivation 1991 (Reference = 1 (Least))	8.9%	9.3%
2	12.8%	14.9%
3	18.0%	17.7%
4	24.6%	24.5%
5	35.7%	33.6%
Social Renting 1991 (reference = 0 - 20%)	26.9%	20.3%
20-40%	7.7%	17.1%
40-60%	11.9%	17.2%
60-80%	19.9%	22.9%
80-100%	33.6%	22.5%
Urban-rural classification 1991 (reference = remote) [†]	4.4%	4.4%
Accessible Rural Areas	10.2%	10.2%
Remote Towns	1.9%	1.9%
Small Towns	10.0%	10.0%
Urban Areas	31.2%	31.2%
Cities	42.3%	42.3%
<i>Individual and Household level variables</i>		
Qualifications 1991 (reference = none)		85.3%
Less than degree		2.6%
Degree or better		2.6%
Not stated		5.2%
Tenure 1991 (reference = owners)		34.7%
Social Renter		58.1%
Private Renter		7.2%
Age (average age in 1991)		28.9 years
Female (reference = male)		33.2%
Ethnic (reference = non ethnic)		0.9%
Change in health (reference = no LLTI)		88.5%
LLTI 91 & 01		1.1%
LLTI 91		2.1%
LLTI 01		8.3%
Change in Household Type (reference = couple)		55.4%
91 & 01 Single		9.4%
91 Single / 01 Couple		4.4%
91 Couple / 01 Single		30.8%
Change in presence of children (reference = Children)		24.4%
91 / 01 No Children		41.1%
91 No Child / 01 Child		14.9%
91 Child / 01 No Child		19.6%
[†] The Urban-rural classification is the same for CATTs and OAs assuming perfect nesting of geographies.		

Table 2: Modelling occupational mobility using change in ISEI score between 1991 and 2001 (part 1).

	Model 1			Model 2			Model 3			Model 4			Model 5			Model 6		
	Coeff	s.e	sig	Coeff	s.e	sig	Coeff	s.e	sig	Coeff	s.e	sig	Coeff	s.e	sig	Coeff	s.e	sig
<i>Neighbourhood level variables</i>																		
Carstairs Deprivation 1991 (Reference = 1 (Least))																		
2	-1.341	0.145	***	-0.963	0.149	**	-0.923	0.147	***	-0.765	0.145	***	-0.714	0.144	***	-0.937	0.146	***
3	-2.243	0.152	***	-1.194	0.168	***	-1.309	0.168	***	-1.076	0.166	***	-0.991	0.166	***	-1.401	0.168	***
4	-2.869	0.160	***	-1.263	0.191	***	-1.551	0.192	***	-1.237	0.190	***	-1.120	0.190	***	-1.634	0.194	***
5	-3.289	0.179	***	-1.126	0.228	***	-1.669	0.234	***	-1.345	0.232	***	-1.183	0.232	***	-1.815	0.234	***
Social Renting 1991 (reference = 0 - 20%)																		
20-40%				-1.136	0.179	***	-0.951	0.181	***	-0.677	0.178	***	-0.617	0.179	***	-0.476	0.179	***
40-60%				-1.783	0.178	***	-1.724	0.181	***	-1.267	0.180	***	-1.079	0.187	***	-0.842	0.187	***
60-80%				-2.235	0.183	***	-2.177	0.185	***	-1.676	0.185	***	-1.326	0.200	***	-1.029	0.201	***
80-100%				-2.822	0.204	***	-2.769	0.206	***	-2.229	0.206	***	-1.586	0.236	***	-1.332	0.238	***
Urban-rural classification 1991 (reference = cities)																		
Urban Areas							-0.674	0.123	***	-0.442	0.122	***	-0.454	0.122	***	-0.481	0.123	***
Small Towns							-0.895	0.176	***	-0.718	0.174	***	-0.724	0.174	***	-0.653	0.175	***
Remote Towns							-1.703	0.288	***	-1.573	0.287	***	-1.479	0.287	***	-1.296	0.292	***
Rural Areas							-1.704	0.162	***	-1.644	0.160	***	-1.508	0.161	***	-1.279	0.162	***
Remote Areas							-2.943	0.227	***	-2.986	0.226	***	-2.749	0.227	***	-2.260	0.228	***
Qualifications 1991 (reference = none)																		
Less than degree										4.467	0.165	***	4.443	0.165	***	-0.036	0.354	
More than degree										8.176	0.196	***	8.222	0.196	***	1.362	0.154	***
None stated										0.248	0.357		0.244	0.357		-0.576	0.257	**
Tenure 1991 (reference = Social Renters)																		
Owner Occupier													1.075	0.153	***	1.362	0.154	***
Private Renter													-0.392	0.256		-0.576	0.257	**

Table 2: Modelling occupational mobility using change in ISEI score between 1991 and 2001 (part 2).

	Model 1			Model 2			Model 3			Model 4			Model 5			Model 6		
	Coeff	s.e	sig	Coeff	s.e	sig	Coeff	s.e	sig	Coeff	s.e	sig	Coeff	s.e	sig	Coeff	s.e	sig
<i>Individual and Household level variables</i>																		
ISEI Score 1991	-0.320	0.003	***	-0.328	0.004	***	-0.336	0.004	***	-0.418	0.004	***	-0.422	0.004	***	-0.421	0.004	***
Female (reference = male)																0.633	0.099	***
Ethnic (reference = non ethnic)																-0.297	0.634	
Change in health (reference = no LLTI)																		
LLTI 91 & 01																0.044	0.542	
LLTI 91																-0.403	0.496	
LLTI 01																-1.022	0.205	***
Change in Household Type (reference = couple)																		
91 & 01 Single																0.029	0.233	
91 Single / 01 Couple																1.016	0.271	***
91 Couple / 01 Single																-0.023	0.135	
Change in presence of children (reference = children)																		
91 / 01 No Children																0.188	0.137	
91 No Child / 01 Child																-0.772	0.166	***
91 Child / 01 No Child																0.362	0.146	***
Constant	17.150	0.204	***	17.632	0.207	***	18.819	0.229	***	20.490	0.234	***	19.004	0.248	***	25.279	0.345	***
R2	0.135			0.170			0.170			0.172			0.171			0.187		
Obs	56287																	

Table 3: Tenure split models for occupational mobility using change in ISEI score between 1991 and 2001 (part 1).

	Social Renters						Owner Occupiers					
	Model 7			Model 8			Model 9			Model 10		
	Coeff	s.e	sig	Coeff	s.e	sig	Coeff	s.e	sig	Coeff	s.e	sig
ISEI Score 1991	-0.375	0.010	***	-0.439	0.010	***	-0.344	0.005	***	-0.424	0.005	***
<i>Neighbourhood level variables</i>												
Carstairs Deprivation 1991 (Reference = 1 (Least))												
2.000	-0.159	0.956		0.637	0.874		-1.366	0.173	***	-0.983	0.156	***
3.000	-0.241	0.922		0.406	0.860		-2.274	0.190	***	-1.498	0.188	***
4.000	0.078	0.914		0.929	0.866		-3.081	0.214	***	-2.058	0.228	***
5.000	-0.278	0.914		0.426	0.881		-3.205	0.296	***	-1.871	0.314	***
Social Renting 1991 (reference = 0 - 20%)												
20-40%				-0.939	0.709					-0.441	0.201	**
40-60%				-0.851	0.664					-0.830	0.220	***
60-80%				-1.075	0.661					-1.137	0.244	***
80-100%				-1.447	0.665	**				-1.664	0.368	***
Urban-rural classification 1991 (reference = cities)												
Urban Areas				-0.483	0.240	**				-0.392	0.146	***
Small Towns				-0.250	0.344					-0.720	0.209	***
Remote Towns				-1.445	0.493	***				-1.174	0.384	***
Rural Areas				-0.280	0.367					-1.211	0.192	***
Remote Areas				-1.461	0.526	***				-2.368	0.281	***
Qualifications 1991 (reference = none)												
Less than degree				5.380	0.545	***				4.320	0.182	***
More than degree				10.170	0.910	***				8.177	0.215	***
None stated				0.318	0.660					-0.150	0.444	

Table 3: Tenure split models for occupational mobility using change in ISEI score between 1991 and 2001 (part 2).

	Social Renters						Owner Occupiers					
	Model 7			Model 8			Model 9			Model 10		
	Coeff	s.e	sig	Coeff	s.e	sig	Coeff	s.e	sig	Coeff	s.e	sig
<i>Individual and Household level variables</i>												
Age in years (1991)				-0.189	0.011	***				-0.168	0.007	***
Female (reference = male)				1.095	0.204	***				0.358	0.118	***
Ethnic (reference = non ethnic)				4.517	2.277	**				-1.046	0.655	
Partner Works 1991 (reference = not work)												
Change in health (reference = no LLTI)												
LLTI 91 & 01				0.463	0.953					-0.024	0.693	
LLTI 91				0.280	0.879					-0.707	0.642	
LLTI 01				-0.782	0.396	**				-1.104	0.250	***
Change in Household Type (reference = couple)												
91 & 01 Single				-0.205	0.417					0.145	0.306	
91 Single / 01 Couple				1.103	0.529	**				1.040	0.344	***
91 Couple / 01 Single				-0.011	0.247					-0.046	0.168	
Change in presence of children (reference = children)												
91 / 01 No Children				0.814	0.279	***				0.019	0.164	
91 No Child / 01 Child				-0.313	0.346					-0.929	0.198	***
91 Child / 01 No Child				0.674	0.289	***				0.244	0.173	
Constant	13.278	0.775	***	24.023	0.847	***	19.256	0.267	***	26.965	0.382	***
R2	0.131			0.173			0.150			0.193		
Obs	13511						42776					