Chapter 10 – Scotland's Census as a Research Resource

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Introduction

Scotland's census is amongst the most important research resources available to those wishing to investigate the nature and significance of population change in Scotland. Each decennial census provides a fascinating snapshot of Scotland's inhabitants on a particular date. Not only the size and composition of the population and its variations across Scotland, but all sorts of information about marriage and partnership, housing and household size, economic activity, religion and ethnicity, and migration and mobility can be gleaned from the census. Such basic information is important to good governance. However, it is the ability to compare one census with another, and in recent years to link census data to other statistical sources (for example, health records), that has unlocked the greater potential of the census as a means of understanding the complex facets of demographic, economic and social change in Scotland. This chapter illustrates how data from recent censuses have been used to analyse and interpret population change. It thus highlights the significance of Scotland's census, not only to those in government but also to researchers interested in investigating the causes and meanings underpinning key changes in the characteristics of Scotland's population (Graham and Boyle, 2004).

The census has a long history of providing information on the population of Scotland and its regions. This history stretches back to the first modern census in 1801. Since then insights into the nature of the Scottish population have become richer and more detailed as more census questions have been added on an ever-widening spectrum of topics (White, 2010). While this has provided government with the opportunity to govern more effectively and more equitably, for the researcher the increased detail offered by the census (combined with its authority as a means of representing the vast majority of Scotland's people in a way that a sample survey can never hope to achieve) has allowed the use of more complex analytical tools. The result has been a deeper understanding of the social and economic forces underpinning the demographic picture at each census and, more importantly, of the drivers accounting for changes in the country's socio-demographic profile.

As well as examining population change over time, researchers have turned their attention to geographical variations within Scotland. The 'mapping' of Scotland's population has often simply been included along with UK-wide representations[1] such as those offered by the 1980 publication *People in Britain* (Census Research Unit, 1980). This collaborative project between the Census Offices and a group of academics showed the socio-economic and demographic characteristics of Scotland's population in unprecedented detail using a matrix of one kilometre grid squares. The atlas demonstrated, in a way never before appreciated, just how unique the census is as a means of researching small-area variations in a systematic fashion. Later snapshot cartographies included Dorling's (1995) landmark *Social Atlas of Britain,* which used population-weighted cartograms and a

[1] An early exception would be JB Caird's map of Scotland's population based on the 1961 Scottish census.

diversity of new census variables. To take only one example, the maps revealed just how different Scotland was from the rest of the UK in terms of ethnicity (a question first asked in the 1991 census). This was true not only in terms of the lower proportion of visible ethnic minorities compared with most other parts of the UK, but also in terms of little recognised facts such as that 'the largest group of immigrants in Britain are the English in Scotland and Wales' (Dorling, 1995, 46). Similar projects followed after the 2001 census when Dorling (2005; 2010) and others (Shaw et al, 2008) argued that the chief purpose of undertaking comparative cross-sectional analyses of census and other national statistics is not simply to satisfy academic curiosity about unexpected patterns, but more importantly to raise questions of social justice. The mapping of census data provide a vivid picture of the gross socio-spatial inequalities, including those in health and life expectancy, across the UK and graphically illustrate that geography matters!

If cross-sectional analysis of statistical data is academically valuable, even more exciting has been scholarly use of the census to explore the drivers of population change. For the first time following the 2001 Census, a coordinated Scottish programme of research (ESRC/Scottish Government, 2008) was launched that drew together academics from several different disciplines (from geography to economics and sociology) with the dual goals of understanding the changes in Scotland's mortality, fertility and mobility and the implications for Scotland's politicians, business people, and general public[2]. Projects explored the macroeconomic impacts of demographic change, fertility in Scotland compared to England, fertility variations within Scotland, the ageing of Scotland's population, and different aspects of migration to and from Scotland. The Scottish Government has recognised the great value of these studies, not only in advancing the understanding of individual demographic processes but also as 'a key body of work' helping the Scottish Government to achieve its goals, including its population growth target of matching average European (EU15) population growth over the period 2007 to 2017.

Population research in Scotland has been strengthened further by the setting up of the ESRC Centre for Population Change, a collaborative project between a consortium of Scottish universities, the University of Southampton, the Office of National Statistics and the National Records of Scotland. New and on-going research is steadily increasing knowledge of Scotland's population and enhancing the evidence base needed for policy development. In the rest of the chapter, three case studies are presented to illustrate the value of Scotland's census as a research resource. These deal with topics of current social and economic significance relating to health, return migration to Scotland, and employment. The first is a comparative study of health in Scotland and England. The other two case studies focus on issues relating to population change over time. All demonstrate the value of new census-based data sets (especially the Samples of Anonymised Records and the Scottish Longitudinal Study) which are now making it possible to answer more complex questions.

[2] There had been a history of the Economic and Social Research Council funding valuable census research programmes, but these were not specific to Scotland.

Case study 1: The health of Scotland's population

The health of a country's population is related to many things including the provision of universal free health services (like the NHS), the level of unhealthy behaviours (smoking for example) and also the economic circumstances of the population (for example the levels of poverty and unemployment). Although the life expectancy of the Scottish population keeps improving year on year, Scotland has a lower life expectancy than many other Western European countries. Scotland has not always lagged behind the rest of Western Europe as its life expectancy was comparatively good in the first half of the twentieth century, but its position has deteriorated more recently. Death rates amongst those of working age, in particular, are comparatively high in Scotland. In looking at reasons for Scotland's poor health performance, researchers have often contrasted it with England and Wales which has higher life expectancy.

One reason that has been explored is that Scotland as a whole has had high levels of poverty and unemployment relative to national levels in England and Wales. Research conducted utilising data from around the 1981 Census found that a large part of Scotland's excess mortality rate could be explained by the higher levels of deprivation (a combined measure of poverty and unemployment) in Scotland. However, when this research was repeated utilising data from around the 1991 and 2001 Censuses, it was found that a smaller proportion (although still a sizeable minority) of Scotland's excess mortality rate compared to England and Wales could be explained by its higher rates of deprivation (Hanlon et al., 2005). The remaining unexplained excess mortality in Scotland was named the 'Scottish effect' and it remains unexplained today although research is on-going to find an explanation.

There have been numerous reasons suggested for this unexplained excess. One possibility is that it is not enough just to take current economic circumstances into account as research has shown that differences in economic circumstances across a person's life can impact on the risk of death in older age. For example, those growing up in poverty may have, on average, a slightly higher risk of death independent of their economic circumstances in later life. So in Scotland's case, as levels of deprivation have declined in more recent years (although remaining higher than in England and Wales), measures of deprivation may no longer capture adequately the poorer average economic circumstances of the Scottish population in the past. Indirect evidence to support this comes from research that shows that people born in Scotland but who moved elsewhere in the UK (i.e. to England and Wales and Northern Ireland) have higher mortality rates than those born and living in England and Wales and Northern Ireland (Popham et al., 2010). In turn, migrants to Scotland tend to have lower death rates than those born in Scotland, recent research confirming that these differences cannot be explained by differences in current deprivation levels.

Most of the research to date has focused on differences in death rates. Although we all die eventually, only a small percentage of the population dies each year. Therefore, across the population, deaths are relatively rare events. As we all live longer, it becomes informative to measure levels of poor health, because it is more common. Using information collected in Scotland's Census of 2001, this study sought to answer a key question: 'Is there a Scottish effect for self-rated health?' (Popham, 2006). It extended 'Scottish effect' research by looking at whether rates of excess poor health in Scotland could be explained by

current socio-economic circumstances and whether country of birth was important. The 2001 Census was used to research this question because it contained the relevant information on health, country of birth and economic circumstances. People were asked two health questions. The first was on limiting illness: “Do you have any long-term illness, health problem or disability which limits your daily activities or the work you can do?”. The second was on general health: "Over the last twelve months would you say your health has on the whole been: good, fairly good or not good?". Measuring levels of poor health is relatively complex because the definition of poor health can vary from person to person. Additionally, complete data on all people experiencing all types of disease are not available. However, it has been shown that asking people simply to rate their own health can provide a good picture of population health as these questions do capture health well. For example, research has shown that people rating their health as poor, on average, have a higher subsequent risk of death even after accounting for other risk factors.

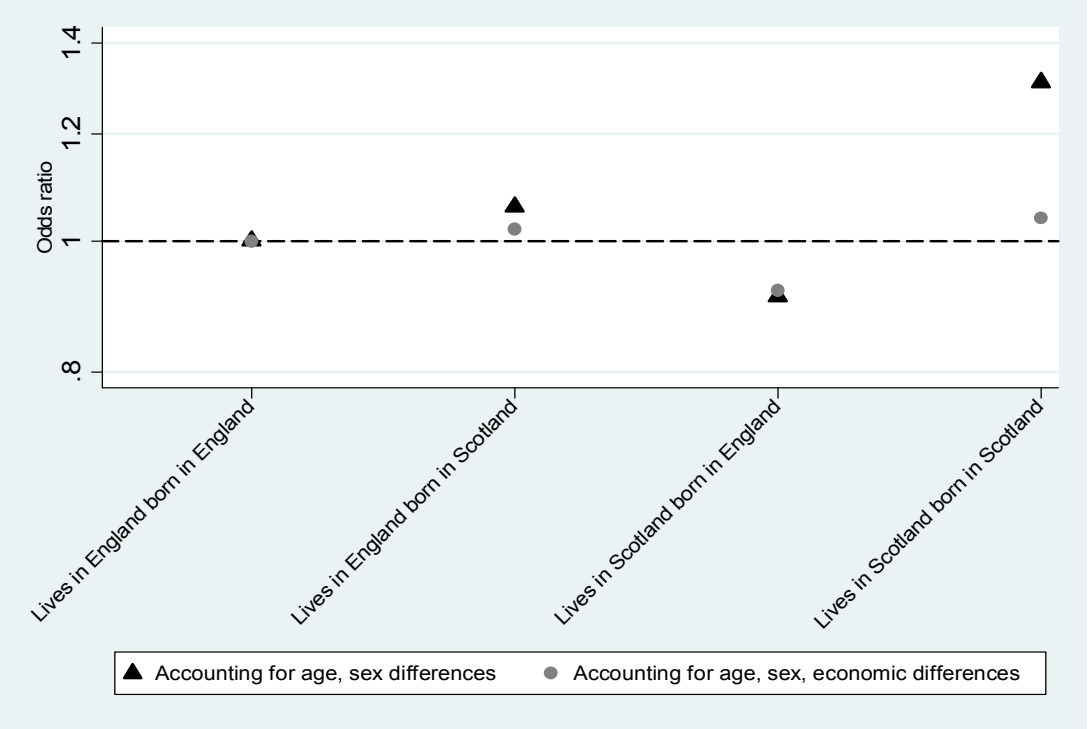
Census results in an anonymised form (to preserve confidentiality) are made available to the general public, policy makers and researchers in various forms. The Samples of Anonymised Records (SARs) were used in this study. They give researchers access to a limited number of census variables for an anonymised sample of the UK population (a 3 per cent sample in this case). The SARs started with the 1991 Census and, in addition to the 2001 SARs, SARs are planned for the 2011 Census[3]. Although England and Wales, Scotland and Northern Ireland conduct separate censuses there is much co-ordination, meaning that the same or very similar questions were asked in all the Censuses in 2001. This allowed a comparison to be made between the levels of poor health reported in Scotland compared to those reported in England, by country of birth (limited to those born in England and Scotland) for those of working age (aged 25 to 64). Importantly, the census covers all sections of the population and so it provides the most representative information on the population.

Overall 768,885 people were included in the analysis. The majority were born and living in England (87.3 per cent), 2.1 per cent were born in Scotland but living in England, 1.1 per cent were born in England but living in Scotland and 9.5 per cent were born and living in Scotland. Just over 9 per cent of people reported having poor (not good) general health. After accounting statistically for any age and sex differences between the groups, those born and living in Scotland were found to be most likely to report poor health. This is illustrated in Figure 10.1 where the odds ratio of poor general health is given for each country of birth and residence combination, comparing the other groups to those born and living in England who have the reference value of one. An odds ratio of above one means a higher rate of poor general health and below one a lower rate. Those born in Scotland and living in England had very slightly worse health compared to the reference group but the difference was small, while those born in England and living in Scotland had slightly better health. To investigate further the apparent health disadvantage of the Scots-born, the economic differences between the groups were then examined. Of the four groups, individuals born and living in Scotland were most likely to live in socially rented housing, not to have access to a car, to live in deprived housing conditions and to be unemployed or economically inactive. Housing tenure, car access, housing conditions and employment status are all markers of economic status that have been shown to be associated with how people rate their health. Thus the poorer average economic conditions of those born and

[3] More details on the SARs are available at www.ccsr.ac.uk/sars/.

living in Scotland could be the reason for their higher rate of poor general health. This was tested by statistically accounting for the differences in these economic markers and the results are also shown in Figure 10.1.

Figure 10.1 Odds ratio for poor general health by country of residence and birth



The odds ratio for those born in and living in Scotland was lowered and was reduced to just above one, suggesting that the rate of general health is very similar to that of those born and living in England once economic factors have been taken into consideration. Thus there appears to be no evidence of a 'Scottish effect' as the excess poor general health can be explained by differences in economic circumstances. The odds ratios were little changed for the other two groups as they were similar in economic profile to those born and living in England. When the statistical analysis was conducted with limiting illness, rather than general health, as the outcome of interest, results were very similar.[4]

Why is a 'Scottish effect' found for mortality but not self-ratings of health? One of several possible reasons is that self-ratings of health, although associated with later mortality risk, capture present or more recent health rather than health risk accumulated across one's life. Thus current economic circumstances rather than circumstances in the past may be most important for how people rate their health. This study raises the important possibility that decreasing poverty and non-employment in Scotland may be beneficial for the health of its population although it should be recognised that there is an on-going debate about the relative importance of tackling poverty to improve health or improving health to tackle poverty.

[4] The full results are available at http://www.biomedcentral.com/content/pdf/1471-2458-6-191.pdf

Case study 2: Scots return migrants to Scotland

Scottish population growth through in-migration potentially plays an important role in Scotland's prosperity, yet understanding of migration flows to and from Scotland is limited. In-migration flows include Scots returning home after a period living outside Scotland. These Scots-born returnees from the rest of the UK and overseas made up 29 per cent of all migrants into Scotland in the twelve months prior to the 2001 Census. This study aimed to fill some of the existing evidence gaps in relation to migration to and from Scotland by investigating the characteristics of Scots return migrants using data from the census and the Scottish Longitudinal Study. The analysis explored the demographic and socio-economic profile of Scots-born individuals who left and returned to Scotland in the ten year period between the 1991 and 2001 Censuses. The occupational mobility of these migrants was compared to that of other groups, and the factors that determined levels of occupational mobility were investigated.[5]

The Scottish Longitudinal Study (SLS) is a 5.3 per cent nationally representative sample of the Scottish population comprising anonymised data mainly from the 1991 and 2001 Censuses and vital events (births, marriages and deaths) registration. It has a large sample size (274,055 sample members in 1991), which allows for the examination of relatively small subgroups. The National Health Service Central Register (NHSCR), which records movements of patients between health boards (based on registrations with General Practitioners), was used to identify the entry or exit of SLS members into and out of Scotland. It was, therefore, possible to identify a particular sub-set of Scots return migrants and to draw out their demographic and socio-economic characteristics. Returnees were defined as Scots-born SLS members who were recorded as leaving and later returning to Scotland. Most had returned after a period living somewhere in the rest of the UK but the sample also included returnees from overseas. Members of this study cohort were present in Scotland at both the 1991 and the 2001 Censuses, and left and returned to Scotland in the period between the censuses. This analysis thus covered a particular sub-set of Scots return migrants.

While the SLS dataset is an extremely valuable resource for those studying Scotland's population, it may not identify all migrants. The SLS relies on the NHSCR to flag the relocation of sample members, so that those who do not register with a GP when they move (especially young men and short-term migrants) may be missed. In addition, people migrating overseas are less likely to be identified as migrants than those migrating to other parts of the UK. This is because, even if people in the latter group do not inform their GP that they are leaving Scotland, they will be picked up by the NHSCR as having left Scotland when they register with a new GP in another part of the UK.

The SLS contains 1,524 Scots-born individuals who left and returned to Scotland between the 1991 and 2001 Censuses. Return migrants were more likely to be female than male (59 per cent versus 41 per cent) and had a relatively young age profile, with average ages at last exit from Scotland of 26, at last entry to Scotland of 28, and of 30 at the time of the 2001 Census. Compared with the general Scottish population in 2001, these return migrants had a favourable educational profile (Figure 10.2) and were more likely to be in managerial or professional jobs (Figure 10.3).

[5] For a full description of these findings see McCollum (2011) available at http://www.scotland.gov.uk/Resource/Doc/341539/0113589.pdf

Figure 10.2 Level of highest qualification, Scots return migrants and general Scottish population, 2001

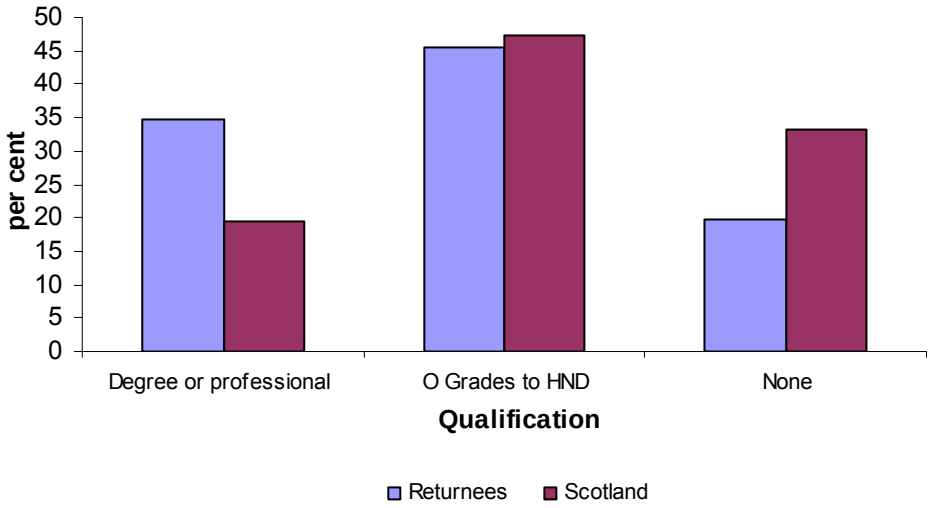
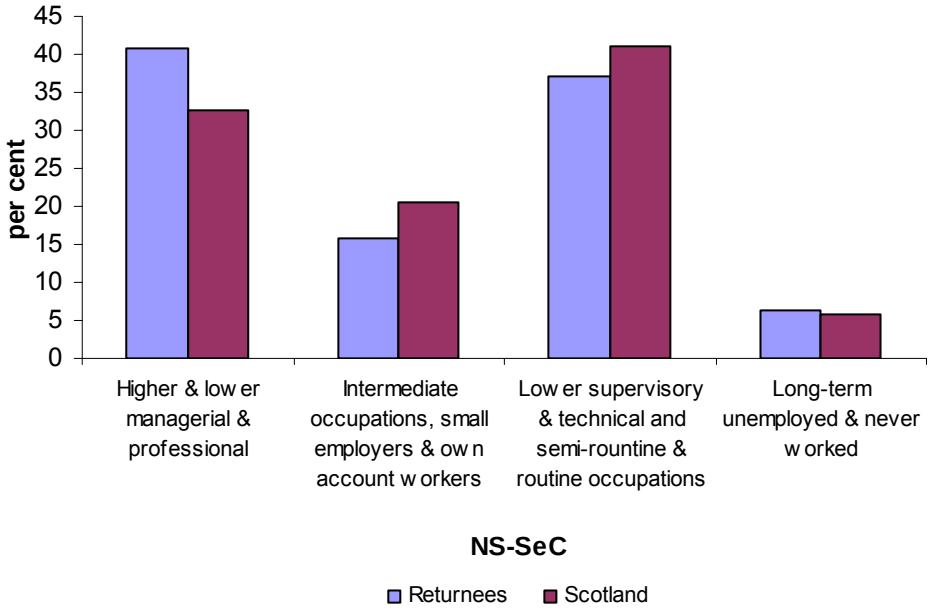


Figure 10.3 National Statistics Socio-economic Class of Scots return migrants and general Scottish population (aged 16-74), 2001



Return migrants generally experienced greater levels of upward occupational mobility relative to other groups. The occupational mobility between 1991 and 2001 of return migrants was compared with three other groups: 1) Scots who remained in Scotland; 2) in-migrants born in the rest of the UK who had lived in Scotland since 1991; and 3) in-migrants born overseas who had lived in Scotland since 1991. In the analysis, group members had to be present in Scotland and employed in both 1991 and 2001. Individuals without a job in either 1991 or 2001 were omitted from the study, as were those who were younger than 15 or older than 55 in 1991. Economically active students were also excluded as this could distort the analysis of occupational mobility trends if, for example, a student was recorded as working in a supermarket part-time whilst studying but became an accountant after graduation.

High occupational status refers to National Statistics Socio-economic Classification (NS-SeC) 1 and 2 (higher managerial occupations, higher professional occupations, lower professional and higher technical occupations). Low occupational status refers to NS-SeC groups 3, 5, 6 and 7 (intermediate occupations, lower supervisory and technical occupations and semi-routine and routine occupations). Scots-born people who migrated from Scotland after 1991 and returned before 2001 had much lower occupational status in 1991 than the two in-migrant groups: 70 per cent were in low status occupations compared to 58 per cent of in-migrants born overseas and 56 per cent of in-migrants born in England and Wales. By 2001, Scots-born return migrants had closed the gap with the two in-migrant groups in terms of their occupational status: 43 per cent of Scots-born returnees were in high status occupations compared to 49 per cent of in-migrants born overseas and 51 per cent of in-migrants born in England and Wales. The greatest contrast was between the returnees and those who had never left Scotland; while 43 per cent of Scots-born return migrants were in higher status occupations by 2001, only 34 per cent of those who had remained in Scotland were in this occupational group. Thus, for Scots, leaving and returning to Scotland may be associated with greater upward occupational mobility compared to those remaining in the country.

A closer examination of occupational change over the decade revealed the relative advantage for Scots-born returnees in terms of occupational status: 20 per cent moved from low to high status occupations between 1991 and 2001 compared to 15 per cent of in-migrants born overseas and 15 per cent of in-migrants born in England and Wales. However around 40 per cent of in-migrants from England and Wales were already in high occupational status jobs by 1991, so could not be recorded as experiencing further upward mobility between the two censuses. Most of those who stayed in Scotland (60 per cent) remained in low occupational status jobs between 1991 and 2001.

The factors associated with mobility from a low to high occupational status versus remaining in low occupational status between 1991 and 2001 were investigated using binary logistic regression models. The findings indicated that having post-school qualifications (especially a university degree, but also vocational qualifications) was by far the most powerful predictor of upward occupational mobility. Other significant determinants of upward occupational mobility included being white (as opposed to a member of an ethnic minority group), in good health, a migrant (as opposed to a ‘stayer’), female and young. Scots return migrants were also shown to have a higher likelihood of upward occupational mobility than Scots who had not engaged in migration (i.e. remained in Scotland between the 1991 and 2001 Censuses).

Some explanations of these findings have been offered in a range of academic papers that stress that migration is a positively selective process engaging the better educated and better qualified elements of the population (Findlay *et al*, 2008 and Findlay *et al*, 2009), with similar positive selectivity amongst in-migrants to Scotland. Contrary to some perceptions, Scots return migrants between 1991 and 2001 were not predominantly retirement migrants, or people whose careers were nearing conclusion (Findlay *et al*, 2009).

Scotland’s census, and in particular the Scottish Longitudinal Study, allow researchers to shed new light on the nature of Scots return migrants. The findings indicate that return migration can be viewed as a valuable source of population and economic growth in

Scotland since the sub-set of returnees analysed were typically younger, better qualified and more likely to be in work and in high occupational status jobs than the general Scottish population in 2001. Leaving, even for a short space of time, and later returning to Scotland also appears to have been beneficial for those involved, since they enjoyed increased levels of upward occupational mobility relative to those who remained in Scotland. Future research using the SLS could re-run this analysis when data from the 2011 Census becomes available. This would generate interesting findings relating to return migration during the recent years of recession (Findlay *et al*, 2010). It would be valuable to discover whether those who return during recession are significantly different in their economic and occupational characteristics from those returning in more prosperous years.

Case Study 3: Neighbourhoods and employment

The neighbourhood in which someone lives may influence their life chances. It is possible, for example, that living in an area with a high proportion of social housing has a negative impact on residents' health and well-being, including their employment prospects. Such thinking lies behind policies designed to create 'mixed communities', which have been enthusiastically adopted throughout the United Kingdom as well as in the Netherlands, Germany, France and Sweden. Large amounts of money have been spent to create neighbourhoods with a mix of housing tenures, and therefore with a mix of socio-economic groups. In addition to urban renewal, the right-to-buy legislation in the UK has also contributed to the development of mixed tenure neighbourhoods. Creating mixed communities is thought to be an important instrument for reducing the perceived negative effects on the individual of living in concentrations of poverty: so-called neighbourhood effects (van Ham & Manley, 2010). The neighbourhood effects hypothesis states that the neighbourhood in which an individual lives can have an independent and causal impact on the life chances of the individuals living there. But what is the evidence for such an effect in Scotland? This study used census data to explore this question.

Much of the early literature on neighbourhood effects focused on the idea that individuals living in concentrations of poverty would adopt deviant cultural values, giving rise to the notion of a culture of poverty (Wilson, 1987). To combat the development of a culture of poverty, it was suggested that communities experiencing severe poverty would benefit from the introduction of positive role models (such as homeowners) who would enrich local networks of residents and help people to get access to employment opportunities. However, recent research on neighbourhood effects has offered a more critical commentary, highlighting the fact that there is a lack of robust quantitative evidence of *causal* neighbourhood effects, and therefore questioning the effectiveness of mixed tenure policies (van Ham et al, 2011). The investigation of causal effects requires data for more than one time period, so data from the Scottish Longitudinal Study (SLS) were used to examine whether the neighbourhood in which one lives has a long lasting effect on employment outcomes in Scotland. The research addressed the following question: to what extent does 1991 neighbourhood tenure mix influence the probability that those who are unemployed in 1991 have a job in 2001? For the purpose of this study the SLS was enriched with aggregate-level census data on neighbourhoods[6].

[6] For the full study, see Van Ham and Manley (2010), available at http://dx.doi.org/10.1093/jeg/lbp017

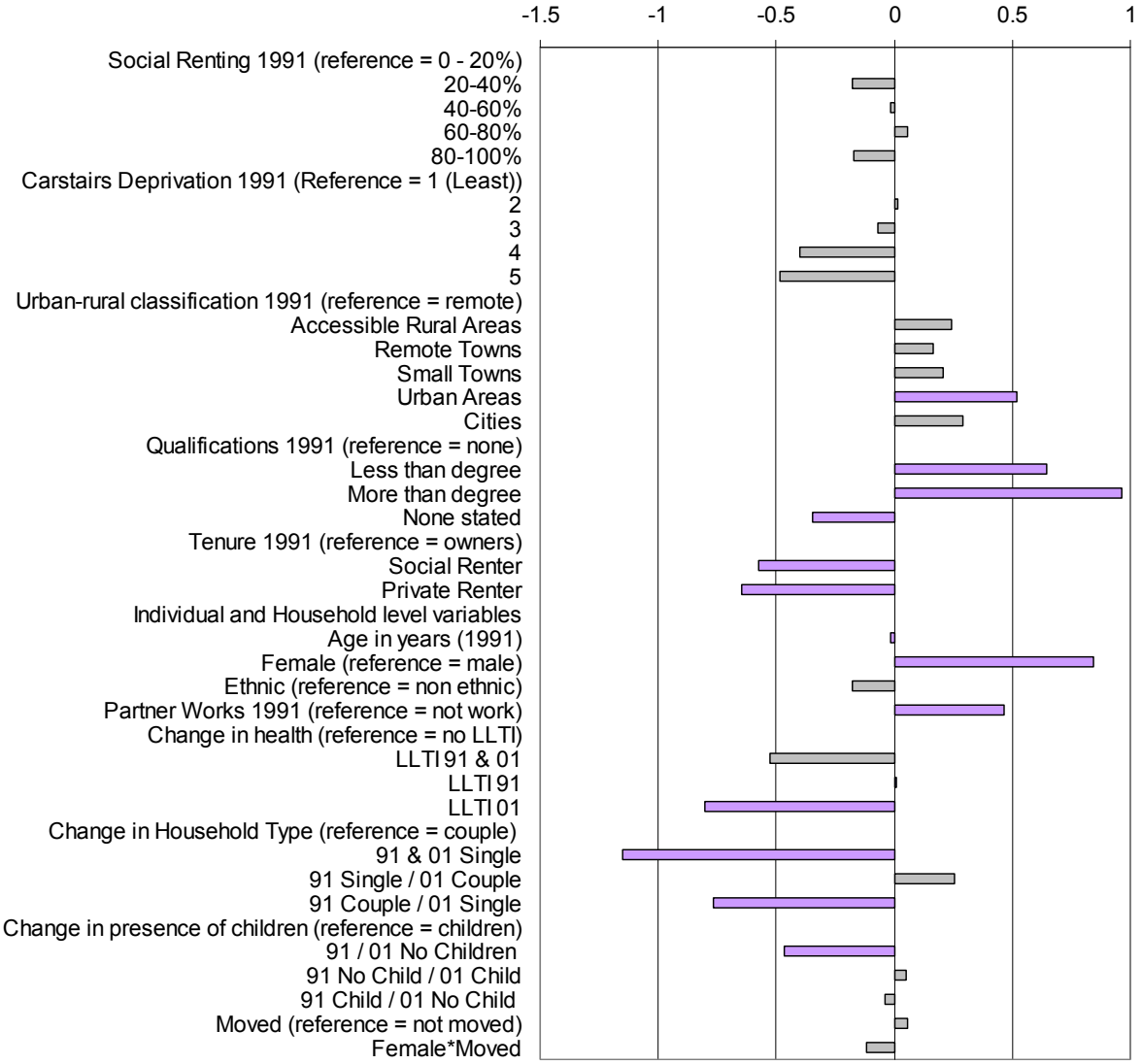
There is surprisingly little convincing evidence in the academic literature that the characteristics of neighbourhoods have an independent causal effect on employment outcomes for individuals or, if there are neighbourhood effects, on how important they are compared to the effects of other characteristics such as education. The problem with most previous studies is that they used cross-sectional data, which do not allow the order of events to be determined. Cross-sectional data cannot reveal whether living in a certain type of neighbourhood contributes to the probability of being unemployed, or whether people were already unemployed before moving to these neighbourhoods (Cheshire, 2007). The core of this problem is that people themselves decide whether to move into, or out of, particular neighbourhoods. Their decisions are not random but depend on personal preferences and characteristics. Studies using cross-sectional data can only demonstrate correlations between neighbourhood characteristics and individual outcomes, not causal relationships. The use of longitudinal data helps to overcome some of the problems associated with modelling neighbourhood effects.

To investigate the effect of neighbourhood tenure mix on employment outcomes, neighbourhood-level information derived from Scotland's census was linked with individual level data from the SLS. The SLS includes geographic identifiers which allowed small areas to be attached to other information while protecting the anonymity of the sample population. To derive a measure of neighbourhood tenure mix, the percentages of social renting in each neighbourhood were classified by quintiles. Those neighbourhoods in quintiles 2, 3 and 4 were considered mixed communities. Carstairs deprivation scores for each neighbourhood were also divided into quintiles. Using these broad categories (quintiles) safeguards the anonymity of SLS members and enables the investigation of threshold effects – the idea that high concentrations of deprivation or social housing above a certain threshold can be more detrimental than lower concentrations. This study examined neighbourhoods which contained on average 500 people. From the full SLS dataset, all unemployed individuals (excluding students) aged between 16 and 55 in 1991 were selected as the research population. The longitudinal character of the SLS allowed the 1991 neighbourhood characteristics to be linked to employment outcomes for the same people 10 years later. Three logistic regression models were fitted, predicting the probability that people unemployed in 1991 were employed in 2001.

The first model looked at whether the percentage of social renting in the neighbourhood of residence affected the probability that an individual who was unemployed in 1991 had a job in 2001. The results clearly showed that the higher the level of social renting in the neighbourhood in 1991, the less likely an individual was to be in employment in 2001. In particular, those living in neighbourhoods where 80 per cent or more of houses were social renting were found to be less than half as likely to be in employment 10 years later compared with those living in neighbourhoods with 20 per cent or less of social renting. However, this model took no account of other characteristics of the neighbourhood such as its level of deprivation. So the second model included measures of neighbourhood deprivation and showed that the more deprived the neighbourhood of residence in 1991, the less likely people were to be in employment in 2001. Indeed, it showed that housing tenure mix had little influence; it was deprivation which was the important factor. The final model included a range of neighbourhood, household and individual variables also known to influence labour market outcomes, providing a more robust test of the neighbourhood effect. The results are summarised in Figure 10.4, which shows that neither neighbourhood housing tenure mix (the top 4 bars) nor the neighbourhood's level of

deprivation (the next 4 bars) in 1991 had an effect on the probability of being employed in 2001. Rather, individual and household characteristics, such as educational qualifications and household composition (purple bars), were the important factors. These results suggest that, for Scotland, there is no independent causal effect of neighbourhood tenure mix on employment outcomes. However, they do not provide a definitive answer to the research question because there is reason to believe that neighbourhood effects do not influence all individuals in the neighbourhood in the same way.

Figure 10.4 Model showing no significant effects of neighbourhood characteristics on the probability of having a job in 2001 (purple bars represent statistically significant coefficients)



In order to explore potentially diverse effects of neighbourhood tenure mix, the models were rerun for subsets of the population by age groups, gender, social class and individuals' housing tenure. Significant differences in the association between neighbourhood characteristics in 1991 and employment outcomes for individuals in 2001 were only observed for housing tenure groups. Table 10.1 shows that correlations between neighbourhood deprivation and tenure mix were only significant for home owners,

and not for social renters. This seems surprising as it is highly unlikely that neighbourhood effects affect only the owners and not social renters in the same neighbourhoods. The most likely explanation is that the apparent neighbourhood effects are, in fact, proxy measures for the neighbourhood sorting process. Social renters had limited choice in selecting neighbourhoods, as their dwelling was allocated by housing officers, so they were more or less randomly allocated to neighbourhoods. Low income homeowners, on the other hand, selected themselves into the most deprived neighbourhoods because houses in other neighbourhoods were too expensive. while high income home owners selected themselves into more affluent neighbourhoods. So the correlation between neighbourhood characteristics and employment outcomes for homeowners cannot be interpreted as a causal neighbourhood effect.

Table 10.1 Neighbourhood level coefficients for home owners and social renters

	Owners Occupiers			Social Renters		
	Coefficient	s.e.	Significance	Coefficient	s.e.	Significance
Neighbourhood Level Variables						
Social Renting 1991 (reference 0-20 per cent)						
20 – 40 per cent	-0.074	0.262		0.142	0.410	
40 – 60 per cent	-0.045	0.326	*	0.131	0.442	
60 – 80 per cent	0.460	0.371	***	0.094	0.446	
80 – 100 per cent	0.104	0.522	***	-0.120	0.451	
Carstairs Deprivation 1991 (reference = 1, least deprived)						
2	-0.404	0.339		0.487	0.425	
3	-0.610	0.378		0.501	0.454	
4	-0.896	0.388	**	0.341	0.458	
5	-1.242	0.435	***	0.291	0.472	

Note: the coefficients for the individual variables are excluded for brevity

s.e. is the standard error; significance is *p<0.10, ** p<0.05, ***p<0.01

This study set out to investigate whether neighbourhood tenure mix had an independent effect on individual employment outcomes for a sample of the Scottish population. The research was only possible because detailed individual-level data provided by the SLS could be combined with aggregate neighbourhood information derived from Scotland's census. The longitudinal research design offered a substantial improvement over many of the previous investigations of neighbourhood effects in the UK. In this study, no evidence for causal neighbourhood effects was found. These results have important policy implications because they indicate that creating mixed communities through mixed tenure policies is unlikely to have the desired effects. Given the importance of individual characteristics in understanding employment outcomes in the statistical models, anti-poverty policy targeting individuals with the aim of improving their educational and employment experiences and opportunities may well have greater impact.

Looking forward

The three case studies provide a brief insight into some of the ways that Scotland's census data are being used to advance knowledge of Scotland's population. They are part of a long tradition of research into population change that seeks both to answer academic questions and to provide a sound evidence base for policy development. There is much more that has been and can be done. Census data play a central role in this research because they provide the most complete record that we have of those living in Scotland on one particular date. Over the decades, the census questionnaire has grown in size and complexity, responding to the most important issues of the time. Almost a century ago, the Statistical Superintendent of the Office of the Registrar General for Scotland presented a paper on the 'Fertility of Marriage in Scotland' based on the responses to new questions inserted into the 1911 Census schedule (Dunlop, 1914). Scotland's fertility was known to be in decline but there was need for greater insight into the nature of the decline. The new data provided, for the first time, a detailed picture of fertility change in relation to a wife's age at marriage, the duration of marriage and the occupation of the husband. Studies such as this laid the foundation for a much enhanced understanding of fertility trends in Scotland.

In the early 21st century, fertility trends have again become an important issue for Scottish policy makers. Low and declining fertility is a major driver of population ageing, with implications not only for the provision of services such as schools and health care but also for Scotland's future prosperity (Graham and Boyle, 2004). The population of Scotland has been ageing more rapidly than that in the rest of the United Kingdom, and the causes and consequences have become another focus for contemporary research. For the first time in 2001, UK censuses asked the entire population how much (unpaid) time they spent helping or supporting others. The answers revealed a more extensive network of informal care than previously thought. Particularly striking was the number of older people (30,822 people aged 65 and over in Scotland) who were providing at least 50 hours of unpaid care a week to other family members, friends or neighbours. These data raise many questions because, without the extensive provision of informal care supporting those with chronic illness, the demand on health and social services would be much greater and possibly unsustainable.

2011 is once again census year. In March, all households in the UK received a census schedule for completion. Returns are currently being checked and collated. As in previous censuses, new questions have been developed in response to demand for information on new topics while other questions have been dropped. Detailed data on long-term health conditions, national identity, ability in spoken English, language used in the home, and dates of arrival in the UK will soon be available for the first time and promise new avenues for research. Other questions mirror those asked in previous censuses and will allow researchers to investigate many important dimensions of population change over the past decade. Scotland's census is an unparalleled resource and researchers are looking forward to the release of the 2011 Census results and the opportunities they will provide for the advancement of knowledge and the strengthening of the evidence base for public policies relating to population change in Scotland.

References

Census Research Unit (1980) *People in Britain : a census atlas*, Department of Geography, University of Durham in collaboration with Office of Population Censuses and Surveys, and General Register Office (Scotland).

Cheshire P (2007) *Segregated neighbourhoods and mixed communities*, Joseph Rowntree Foundation.

Dorling D (1995) *A New Social Atlas of Britain*, Wiley: Chichester.

Dorling D (2005) *Human Geography of the UK*, Sage: London.

Dorling D (2010) *Injustice: why social inequality persists*, Policy Press: Bristol.

Dunlop J C (1914) The Fertility of Marriage in Scotland: A Census Study, *Journal of the Royal Statistical Society* 77 (3): 259-299.

ESRC/Scottish Government (2008) *Insights from Scotland's Demography Research Programme*. ESRC: Swindon.

Findlay A, Geddes A and McCollum D (2010) International Migration and Recession, *Scottish Geographical Journal* 126 (4): 299-320.

Findlay A, Mason C, Harrison R, Houston D and McCollum D (2008) Getting off the escalator? A study of Scots out-migration from a global city region, *Environmental and Planning A* 40 (9): 2031-2284.

Findlay A, Mason C, Houston D, McCollum D and Harrison R (2009) Escalators, Elevators and Travelators: The Occupational Mobility of Migrants to South-East England, *Journal of Ethnic and Migration Studies* 35 (6): 861-880.

Graham E and Boyle P (2004) Scotland's demographic regime: population and the politics of devolution, *Scottish Geographical Journal* 119 (4): 361-382

Hanlon P, Lawder R S, Buchanan D, Redpath A, Walsh, D, Wood, R. et al. (2005). Why is mortality higher in Scotland than in England and Wales? Decreasing influence of socioeconomic deprivation between 1981 and 2001 supports the existence of a 'Scottish effect', *Journal of Public Health* 27(2): 199-204.

McCollum D (2011) *The Demographic and Socio-Economic Profile of Return Migrants and Long-Term In-Migrants in Scotland: Evidence from the Scottish Longitudinal Study*, Scottish Government Social Research, The Scottish Government: Edinburgh.

Popham F (2006) Is there a 'Scottish effect' for self-reports of health? Individual level analysis of the 2001 UK census, *BMC Public Health* 6 (1): 191.

Popham F, Boyle P J and Norman P (2010) The Scottish excess in mortality compared to the English and Welsh. Is it a country of residence or country of birth excess? *Health and Place*, 16 (4): 759-762.

Shaw M, Thomas B, Davey Smith G and Dorling D (2010) *The Grim Reaper's Road Map*, Policy Press: Bristol.

van Ham M and Manley D (2010) The effect of neighbourhood housing tenure mix on labour market outcomes: a longitudinal investigation of neighbourhood effects, *Journal of Economic Geography* 10: 257-282.

van Ham M, Manley D, Bailey N, Simpson L and Maclennan D (eds) (2011) *Neighbourhood Effects Research: New Perspectives*, Springer: Dordrecht.

White I (2010) Very Near the Truth. A Brief History of the Census in Scotland, *Scotland's Population 2009*, Registrar General's Annual Review of Demographic Trends, 155th Edition: Edinburgh, 77-107.

Wilson W J (1987) *The Truly Disadvantaged*, University of Chicago Press: Chicago.